


CWRU Medicine

WINTER 2025

The leading edge of education

Transformative
educational approaches
combine technology
and tradition



The Zubizarreta Immersive Learning Suite is one of the only facilities of its kind in the U.S., creating realistic medical scenarios and turning learning into an interactive game.

Research Roundup:
Breakthroughs from
CWRU labs

Swetland Center fights
for environmental
health equity

Six outstanding
scholars shaping
their fields

Celebrate Exceptional Alumni and Friends

Do you know a Case Western Reserve University School of Medicine graduate, colleague or supporter who deserves recognition for their outstanding contributions?

Now is the perfect opportunity to nominate them for an Alumni Award or as a future esteemed speaker! Self-nominations are also welcome. Submit your nominations online at case.edu/medicine/alumni/recognition-awards or reach out to us via email at somalumni@case.edu for more details.



Table of contents



The leading edge of education / p. 18

The Zubizarreta Immersive Learning Suite (ZILS), completed in fall 2023, is one of the only facilities of its kind in the country. Early-adopter faculty members are creating realistic medical scenarios to reinforce key concepts through gamification—turning learning into an interactive and engaging game. These state-of-the-art spaces, combined with innovative initiatives, are part of a broader philosophy of preparing students for a wide range of future roles in healthcare. *(Photo by Annie O’Neill)*

04

From Match Day to rankings, see what’s new at CWRU

28

Get to know six outstanding scholars shaping their fields

40

Research Roundup: Breakthroughs from CWRU labs

44

Restoring connections for individuals with life-altering injuries

48

Medicine’s Commencement Week highlights



CASE WESTERN RESERVE UNIVERSITY School of Medicine

10900 Euclid Ave.
Cleveland, OH 44106-7017
medweb@case.edu

Writers/Editors
Alaina Bartel
Lisa Danielpour
Ilima Loomis
Lauren Marchaza
Emily Mayock
Daniel Robison

Lisa Sweeney
Patty Zamora

Designers
Liz Brown
Cindy Young

School of Medicine Leadership

Stanton L. Gerson, MD
Dean and Senior Vice President for Medical Affairs

Paul Bristol, MBA
Vice Dean, Finance and Administration

Elizabeth Fehsenfeld, DMH, Chief of Staff

Adrianne Fletcher, PhD, MSW, Vice Dean, Diversity, Equity and Inclusion

J. Harry Isaacson, MD
Executive Dean, Cleveland Clinic Lerner College of Medicine of CWRU

Cynthia Kubu, PhD
Vice Dean, Faculty

Lia Logio, MD
Vice Dean, Medical Education

Grace McComsey, MD
Vice Dean, Clinical and Translational Science

Mark Jackson, PhD
Vice Dean, Graduate Education

William Schiemann, PhD
Vice Dean, Research

Gary Schwartz, MD
Vice Dean, Oncology

Lindsey Whitting
Vice Dean, Development and Alumni Relations

Checking in

A Q&A with Dean Stan Gerson

Case Western Reserve University School of Medicine unites a vast network of students, faculty, staff, researchers and healthcare professionals across one university and five campuses that include four hospital affiliates. It's an environment ripe for partnership that can lead to groundbreaking—and life-changing—education and discoveries.

This synergy helps drive the school's theme for the 2024-25 academic year: innovation through collaboration. Read on to learn how Dean **Stan Gerson, MD**, sees this playing out across the school, including for medical education.

CWRU MEDICINE: What are some ways you are seeing innovation through collaboration in action?

DEAN GERSON: Innovation happens in our centers, which bring together experts from multiple disciplines, departments and partner institutions to focus on a crucial field of medical research. This transdisciplinary engagement yields incredible ideas coming from different perspectives and approaches, resulting in new discoveries and therapeutics.

With collaboration at their core, the centers successfully compete for large, multiple-investigator grants that



Members of the CWRU community toured the acute care, VR and immersion rooms during a simulation open house. (Photo by Matt Shiffler)

further research. For example, the **Case Comprehensive Cancer Center** has developed a visionary approach to treating rare cancers, and the **Digestive Health Research Institute** is making tremendous strides for understanding and addressing devastating digestive diseases such as inflammatory bowel diseases.

We're expanding our pursuit of discovery with the new **Center for Artificial Intelligence in Drug Discovery** and the **Center for Mitochondrial Research and Therapeutics**. Mitochondria are the energy powerhouse of cells, and defects in their activity are linked to numerous conditions, including neurodegenerative diseases, cancer, cardiovascular diseases and diabetes. And the new chair of the neurosciences department, **Ronald Yu, PhD**, will lead the new Brain Health Collective and critical research on neurodegenerative conditions and mental health (p. 8).

CWRU MEDICINE: How do students and trainees benefit from the drive toward discovery?

DEAN GERSON: Our school does an exceptional job of preparing students—from high schoolers to postdoctoral fellows—to be directly involved in cutting-edge research with individual mentorship. Biomedical education is at the core of our research-focused centers. Plus, we have a dedicated **Center for Medical Education**, where leaders strive to improve curriculum to help the next genera-



Dean Gerson speaks to participants of the School of Medicine's 2024 Match Day. (Photo by Dan Milner)

tion of physicians and medical scientists become superb practitioners and apply novel discoveries into medical practice. Innovative training prepares students to apply their knowledge in patient care and laboratories, and with physicians and investigators (p. 18).

CWRU MEDICINE: How has the pursuit of innovation in research and education at the School of Medicine evolved over time?

DEAN GERSON: We have a long history of innovation that includes the first successful defibrillation of the human heart, first creation of an artificial human chromosome and first stool DNA tests for early detection of colon cancer. The School of Medicine has benefited from exceptionally innovative leaders—such as **Nate Berger**, who passed away in June (p. 53)—whose work leaves indelible marks on medical education, research and the broader Cleveland community.



The state-of-the-art simulation spaces in Samson Pavilion foster hands-on learning that helps students sharpen their critical thinking and teamwork skills in real time. (Photo by Matt Shiffler)

Rankings and ratings

#16 among private medical schools*

Every year brings new and remarkable growth at Case Western Reserve University School of Medicine. Here's a quick look at some of the most noteworthy numbers over the last year.

#23 in National Institutes of Health funding among all U.S. medical schools*

One of 16 schools rated as Tier 1.

#39 in the world for number of U.S. utility patents.

#21 research institution.

#22 Worldwide for biomedical and health sciences.

#2 Physical Medicine*

#11 Pathology*

#11 Biomedical Engineering*

#16 Biochemistry*

#19 Genetics*

#19 Urology*

■ Leiden World Ranking
 ▲ National Academy of Inventors, Intellectual Property Owners Association
 * Blue Ridge Institute for Medical Research
 ● research.com
 ■ U.S. News & World Report

State of the school

\$400M in active research funding

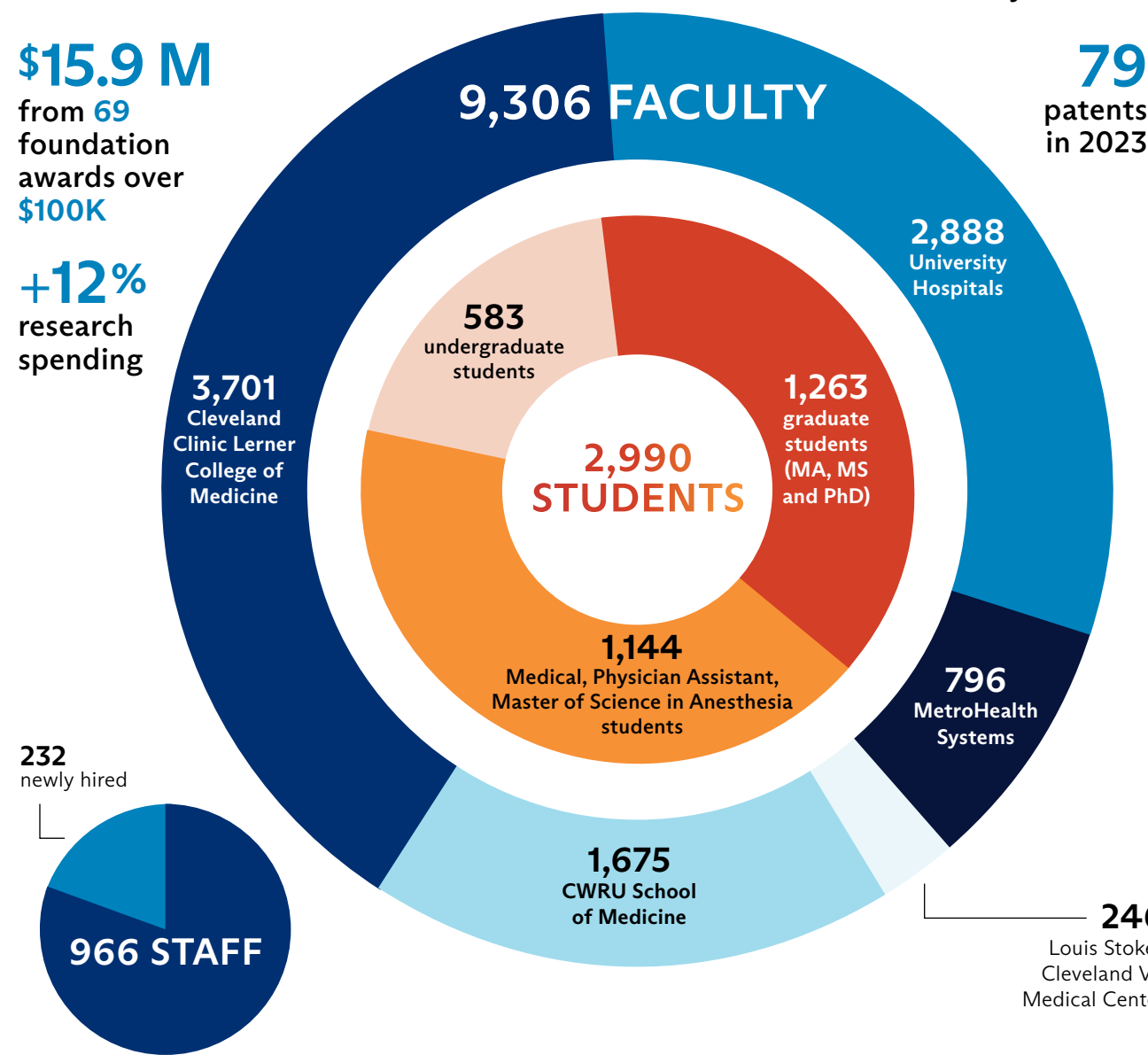
\$15.9 M from 69 foundation awards over \$100K

+12% research spending

RESEARCH AND GRANTS

131 total grants for fiscal year 2024

79 patents in 2023



FACULTY HONORS

16 new endowed chairs

2 new Distinguished University Professors

1 Case Medal for Excellence in Health

News

Honors, events, updates and accomplishments from across CWRU's medical school

SAGE ADVICE

As a new Case Western Reserve medical student, **Katie Zhang** didn't want a skewed view of older patients—especially if those she mainly saw were hospitalized and declining physically or cognitively.

So, she signed up for the Kowal Senior Advisor in Geriatric Education program, an elective course that pairs interested first-year students with active seniors—and met Delores Drake, a 70-year-old whose motto is “you gotta keep it movin’.”

“I've learned so much from her—about life and aging,” said Zhang, who spent time with Drake during nine monthly one-on-one sessions.

With the support of the Jerome Kowal Endowment Fund, CWRU School of Medicine launched the innovative, voluntary program last year to help first-year medical students improve patient communications skills, dispel misconceptions about aging and pique student interest in geriatric care—a specialty that needs more physicians.

“Our entire population is aging, and we're in the job of preparing future physicians,” said **Mamta (Mimi) Singh, MD (GRS '00, epidemiology and biostatistics)**, the Jerome Kowal MD Professor in Geriatric Health Education.

“We wanted students to see thriving, healthy older adults, preferably in the community,” not just ailing in the hospital, she explained.

—Patty Zamora



A MATCH MADE IN HEALTHCARE

After **Dean Stan Gerson, MD**, counted down the seconds to noon, more than 200 eager medical students flocked to tables at the Health Education Campus of CWRU and Cleveland Clinic, ready to tear open the envelopes and learn where they'd spend their next few years as residents.

Across the building, students celebrated with tears of joy and smiles, sharing news of their placements with family and friends in attendance.

Internal medicine and general surgery were top residency matches, followed by psychiatry, pediatrics, neurology, anesthesiology, OB/GYN, ophthalmology and orthopedic surgery. The majority of students matched with their top choice, Dean Gerson said. Notably, 37 students from Ohio matriculated, yet 51 graduates are staying in Ohio for training—a “brain gain” of 14 newly minted physicians for Ohio.

“This achievement underscores the dedication and hard work of our students,” he said during the event, “as well as our outstanding faculty who are committed to excellence in preparing our students to be the next generation of physician leaders.”

Residency destinations include:

- Cleveland Clinic
- Hospital of the University of Pennsylvania
- Massachusetts General Hospital
- Brigham & Women's Hospital
- MetroHealth Medical Center
- Northwestern
- The Ohio State University
- University of California San Diego Medical Center
- University of Michigan Medical Center
- Stanford Health Care
- UCLA Medical Center
- University Hospitals
- University of Pittsburgh Medical Center

A NEW LEADER FOR NEUROSCIENCES

Across its 35 years, Case Western Reserve University's Department of Neurosciences has led groundbreaking research into a range of biomedical issues, including efforts to restore function and regenerate nerves following brain and spinal cord injury.

So when seeking a chair for the renowned department, School of Medicine leadership knew they needed a preeminent researcher. They found it in molecular biologist and neuroscientist **Ron Yu, PhD**.

Yu, whose lab at the Stowers Institute for Medical Research, a Kansas City biomedical research organization, focused on mammalian olfactory systems involved in perception and behaviors, hopes his wealth of expertise will enhance the department's strong work.

“The CWRU neurosciences department has a long his-

tory of success and many prominent neuroscientists,” said Yu. “To be able to step into their shoes and further the work of the department is a very exciting opportunity.”

He also brings an enthusiasm for working with up-and-coming scientists.

“I'm excited about the undergraduate program and the many young students interested in neuroscience,” said, adding how remarkable it is to find a school where students can choose the subject as an undergraduate major.

Enrollment in the neurosciences major, which launched in 2020 as a joint initiative among the School of Medicine and College of Arts and Sciences, grew 450% in its first three years.

“To be among students and educate the young mind—it'll be a new chapter of my career.”



204

residency placements

79

institutions

31%

will pursue careers in primary care specialties

30%

will stay in Ohio

52%

head to residency programs in the Midwest

Outstanding achievements

Students, faculty and staff earn top honors and appointments

Lauren Cruz, a PhD candidate in epidemiology and biostatistics, received the



Cruz

National Institutes of Health's All of Us Research Scholar Program award, that will impact the future of health. Cruz uses diverse datasets to gain a better understanding of complex chronic health

conditions such as glaucoma.

Olivia Dhaliwal, a fifth-year medical student, was named a **Pisacano Leadership Foundation**



Dhaliwal

2024 Scholar, a program that provides opportunities to enhance leadership skills, network and form professional relationships within family medicine.

Chris Flask, PhD, professor of radiology, biomedical engineering and pedi-



Flask

atricians, received the 2023 Distinguished Investigator Award from the **Academy for Radiology and Biomedical Imaging Research** for his contributions to the field of medical imaging.

Scott Frank, MD (GRS '84, family medicine), associate professor emeritus of population and quantitative



Frank

health sciences and of family medicine and community health, received the Duncan Clark Award from the **Association for Prevention Teaching and Research** for his

distinguished record of achievement in the teaching and research of preventive medicine.

Rachel Gardenhire, a third-year MD student, was selected to take part



Gardenhire

in the 2024 **NFL Diversity in Sports Medicine Pipeline Initiative**, which aims to inspire medical students from various backgrounds to consider pursuing careers in sports medicine.

Gardenhire, who co-leads the Sports Medicine Interest Group at CWRU, is conducting a clinical rotation with the **Cleveland Browns** medical staff.

Tae Hun Kim, PhD, assistant professor of biochemistry, received the



Kim

Mallinckrodt Foundation Award—established by the **Edward Mallinckrodt Jr. Foundation** to help the human race through science and medicine—for his biomedical research.

Case Western Reserve received the 2024 **Josiah Macy Jr. Foundation Catalyst Award for Transformation in Graduate Medical Education** for the university's Clinical Teaming Project. Led by **Tyler Reimschisel, MD**, founding associate provost of interprofessional and



Reimschisel

interdisciplinary education and research, and **Kaitlyn Murphy, MD**, assistant professor of pediatrics, the project brings residents, fellows and attending physicians together to create a curriculum aimed at achieving excellence in patient care.



Remy

Kenneth E. Remy, MD, associate professor of medicine, was elected chair of the research section for **Society of Critical Care Medicine**.

JungA "Alexa" Woo, PhD, assistant professor of pathology,



Woo

was awarded the Janett Rosenberg Trubatch Career Development Award by the **Society for Neuroscience** for her originality and creativity research and contribution to the advancement of women in neuroscience.



HONOR OF DISTINCTION

Case Western Reserve bestows the title of Distinguished University Professor—the highest honor the university grants to faculty—upon those who have exceptional records of scholarship and have made significant contributions to their fields, further enhancing the intellectual vibrancy of the university community.

This year, two School of Medicine faculty members were granted the honor: **Jonathan Stamler, MD**, the Robert S. and Sylvia K. Reitman Family Foundation Distinguished Professor of Cardiovascular Innovation, and **Mitch Drumm, PhD**, the Connie and Jim Brown Professor in Cystic Fibrosis Research and professor of pediatrics.

MEDAL OF EXCELLENCE

Hope Barkoukis, PhD (GRS '75, '97, nutrition), chair of Case Western Reserve University's Department of Nutrition, received the highest honor bestowed by the School of Medicine: the Case Medal for Excellence in Health Science Innovation.

Dedicated to improving health through nutrition and wellness as a critical tool alongside medicine, Barkoukis studies how to use medically tailored meals to manage different chronic conditions. Her research ranges from design of nutrition, food and culinary intervention studies to nutrition counseling of culturally diverse populations, competency in body composition techniques, protein analyses and use of mass spec and stable isotopes for metabolic research.

"It is an incredible honor to receive this award and to be among such renowned past recipients," said Barkoukis. "What is most significant is the recognition of innovation in applied nutrition research and education to move the needle forward for better health for all of us. This award reflects the collective effort and innovation of the whole nutrition department that is unique across the country and is making such an impact."

ELEVATED APPOINTMENTS

The National Academy of Inventors named five School of Medicine faculty as senior members for their "remarkable innovation-producing technologies that have brought, or aspire to bring, real impact on the welfare of society."



James P. Babilion, PhD, professor of radiology



Agata A. Exner, PhD (CWR '98; GRS '00, '03, biomedical engineering), professor of radiology and vice chair of basic research



Anirban Sen Gupta, PhD, professor of biomedical engineering



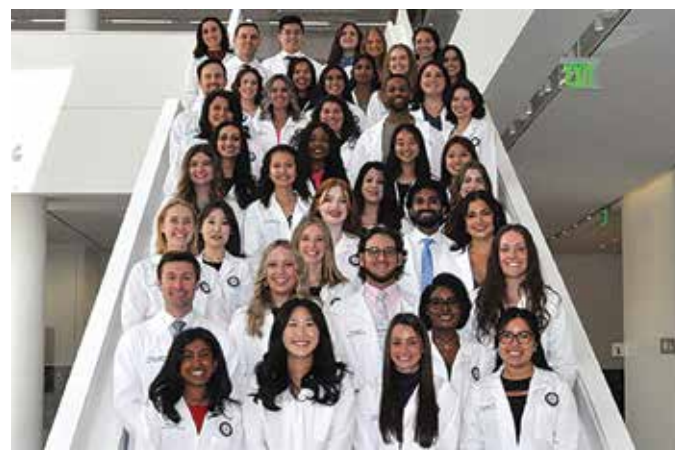
Tina Vrabec, PhD (CWR '90; GRS '95, electrical engineering and applied physics; GRS '16, biomedical engineering), adjunct assistant professor of physical medicine and rehabilitation



David L. Wilson, PhD, professor of radiology and the Robert J. Herbold Professor of Biomedical Engineering



First-year MD students outside Severance Music Center (Courtesy)



2024 first-year physician assistant students in Samson Pavilion (Courtesy)



“You will meet patients on the darkest days of their lives. Walk alongside them. All of the medical knowledge in the world can’t hold a candle to kindness.”

—Wael Barsoum, MD (CWR '91), president and chief transformation officer for the Healthcare Outcomes Performance Co., White Coat Ceremony keynote speaker

Taking the oath

Incoming students step into the healthcare field

White coat ceremonies for first-year MD, PhD and Physician Assistant students at Case Western Reserve University School of Medicine were held in July and August. With equal parts excitement and sincerity, students accepted their white coats, and took their oaths to uphold the highest standards of ethics and patient care. Here’s a snapshot of this year’s long-held tradition.



First-year PhD students in the Tinkham Veale University Center (Courtesy)



The 2023 train derailment in East Palestine, Ohio. (Photo by National Transportation Safety Board)

Convening for change

Swetland Center connects researchers and community to strive for **environmental health equity**

Darcy Freedman, PhD, was nervous as she walked into The Way Station Inc., a community center in East Palestine, Ohio. It was April 10, 2023—more than a year after a train carrying toxic chemicals had derailed in the small Ohio town. The environmental crisis attracted international attention and sent its residents reeling. And they had very little in the way of trust to bestow on outsiders like Freedman.

But Freedman, an applied population health scientist and community psychologist by training, forged ahead. As the director of the Mary Ann Swetland Center

for Environmental Health at Case Western Reserve University School of Medicine, her goal that night was to connect the community affected by the crisis with the researchers and stakeholders who could help them recover.

Looking out at the room full of concerned citizens, Freedman asked what they needed to begin that recovery process.

“They wanted more research, and they were asking questions: Why didn’t the agencies take blood draws? Why didn’t they do urine samples? Why don’t we have these biomarkers?” said Freedman.

Continued on page 16

“

They wanted more research, and they were asking questions:

**Why didn’t the agencies take blood draws?
Why didn’t they do urine samples?
Why don’t we have these biomarkers?”**



Learn more about the Swetland Center

Continued from page 14

And she had questions of her own: “What are the outcomes you care about? How do we design those studies? How do we connect you with other studies?”

This discussion would help shape research on the impact of the toxic tragedy—the perfect example, said Freedman, of integrating the “science of environmental health with community action.”

“But what was clear,” Freedman explained, “is that there was no one institution that could provide all of the support that East Palestine would need to move forward.”

That’s where the Swetland Center would come in.

A forward-thinking founder

Thirty-five years ago, **David Swetland** established an endowed professorship at the School of Medicine in honor of his late wife, Mary Ann, who had died of breast cancer. Its purpose would be to focus on preventive medicine and environmental health. That professor would also come to lead the Swetland Center which, established in 2003, brings scientists together with community partners to better understand the impact of the environment on human health.

“No one was really thinking about the connection between the environment and human health at that time,” said Freedman. “It was a very forward-thinking perspective within the field of medicine.”

No one was really thinking about the connection between the environment and human health at that time. It was a very forward-thinking perspective within the field of medicine.”

— Darcy Freedman, PhD, director of the Mary Ann Swetland Center for Environmental Health



tive within the field of medicine.”

Freedman, who became the center’s director in 2019, has increased its annual budget from \$250,000 to \$2.1 million—a 740% increase.

“I think a lot of our growth was around that space of synergy where we can bring together our expertise and our capacities,” said Freedman. “And we’ve been authentic in our approach, so people want to work with us again. One question leads to another question, or one partnership leads to another partnership.”

Just a few months after the April meeting in East Palestine, Freedman had formed one such partnership: the Ohio/Pennsylvania University Research Consortium. Composed of two dozen researchers from seven universities, responding agencies and members of the East Palestine health community, its goal is to provide accurate, data-driven information that will improve long-term environmental monitoring and public health in East Palestine.

Two researchers in the consortium—School of Medicine genetic epidemiologist and associate professor **Fredrick Schumacher, MD (GRS ’03, public health; GRS ’06, epidemiology and biostatistics)**, and Cleveland Clinic pulmonologist **Maeve MacMurdo, MD (GRS ’22, public health)**—were among the researchers who were awarded grants from the National Institutes of Health to study the impact of the crisis in East Palestine.

As co-investigators for The Healthy Futures Research Project, Schumacher and MacMurdo have recruited hundreds of East Palestine residents, collecting blood samples, saliva, nails and hair for signs of DNA damage beyond what might be expected during someone’s lifetime.



Schumacher



MacMurdo

“We are looking for novel approaches to change the paradigm and identify diseases like cancer early on,” Schumacher said. “We will be able to expand our research and show the people of East Palestine that we are here to help.”

“Understanding the possible long-term health impacts of the train derailment,” said MacMurdo, “is an important first step in giving residents the information they need about the link between exposure and health outcomes.”

Future moves

East Palestine is just one of many projects the Swetland Center has taken on in recent years. In the near future, Freedman will lead the center through other initiatives in areas such as food systems, environmental justice and community-level translational science. Next year, she’ll oversee the relocation of the center to a new home in the Cleveland Foundation’s Midtown Collaboration Center, a mixed-use community center with plenty of space to host conversations like those held in East Palestine.

“The Swetland Center excels at organizing the necessary expertise and resources to address environmental issues that affect human health, such as the situation in East Palestine,” said **Ruth Eppig**, president of the **Sears-Swetland**



Conducting interactive community input sessions is integral to the Swetland Center’s work. (Courtesy of the Mary Ann Swetland Center for Environmental Health)

Family Foundation and granddaughter of founder, David Swetland. “Leveraging its ability to work within and across Case Western Reserve University, partner with other academic institutions and engage with the community, the center is committed to bringing the best translational science to aid in East Palestine’s rebuilding efforts.”

In July, Freedman’s consortium returned to East Palestine—this time meeting at the high school gym—where they shared findings about soil and sediment analysis with residents and brainstormed ideas for future research. The Swetland

Center’s convening role in the crisis will continue to support translation of new study findings for community benefit.

“There’s no way we can recycle our way out of the problems that we see in the world,” said Freedman. “We’re talking about wholesale change of communities.” And in order to make progress toward change, she explained, they must start with building trust. “We have to see where we can find agreement to move forward on a common shared agenda around environmental health equity.”

—Lauren Marchaza

Transformative educational approaches combine technology and tradition to elevate student learning

The LEADING EDGE OF EDUCATION

BY DANIEL ROBISON

Monitors and medical devices beep and whirr amid gurneys rolling down a terrazzo corridor. In a high-tech simulation suite at the Case Western Reserve University School of Medicine, a team of medical students are racing through a hospital—and against the clock—to reach their patient in the operating room.

They need to correctly answer questions to unlock the next stage of this escape-room-like scenario. To find the right answers, they interact with the clinical environment projected onto the walls that also act as touchscreens—letting students read electrocardiograms, calculate glomerular filtration rates and find other health data.

This hands-on, active-learning approach helps students sharpen their critical thinking and teamwork skills in real time.

“Students become immersed in the experience, handling all of the stressors simultaneously so they can be better prepared for real-life situations,” said Lia Logio, MD, professor and vice dean for medical education. “It also makes learning fun—and teams experience deep learning together.”

Continued on page 20

Continued from 19

The medical school's new Zubizarreta Immersive Learning Suite (ZILS), completed in fall 2023, is one of the only facilities of its kind in the country. Early-adopter faculty members are creating realistic

medical scenarios to reinforce key concepts through gamification—turning learning into an interactive and engaging game.

The medical school has hosted demonstrations and workshops to showcase the suite's potential and explore how to integrate its new technologies into the curriculum.

"This suite pushes the boundaries of learning, discovery and creativity," said Miguel Zubizarreta (CWR '90), the facility's namesake and chief technology officer of Westlake, Ohio-based software company Hyland. "The technology allows us to continually expand comprehensive learning experiences for students."

Future simulations could include a busy labor and delivery suite, a dialysis unit or even triage scenarios at the finish line of a marathon.

By combining core medical knowledge with the latest technologies and teamwork, ZILS continues the School of Medicine's tradition of innovative teaching methods in a culture that prioritizes inter-professional learning.

"It shows our innovative spirit and empowers students," Logio said. "Encouraging a love of learning is vital, so we must provide the right tools to inspire curiosity while helping future doctors do their best work."

"This suite pushes the boundaries of learning, discovery and creativity."

— Miguel Zubizarreta (CWR '90)

Realities of residency

As ZILS continues to develop, students in the University Program—the traditional MD degree-granting track at the medical school—are already immersing themselves in intensive, simulation-based training.

The 15,000-square-foot Simulation Center at Case Western Reserve's Health Education Campus with Cleveland Clinic offers a realistic environment where students can practice high-acuity scenarios that are difficult to replicate in traditional classrooms.

This state-of-the-art facility includes ZILS and a mix of exam and acute care rooms that host a number of classes—including the newly launched "Transition to Residency" capstone course.

Designed to equip medical students with hands-on experience and prepare them for the next stage of their careers, the class is "sort of a boot camp of essential skills and knowledge," said Andrew Golden, MD, assistant professor of emergency medicine and course designer.

Continued on page 22





Benjamin Burnham, fellow with the Cleveland Clinic, works with second-year MD students in Samson Pavilion's digital anatomy suite. (Photos by Nicholas McLaughlin)

Continued from 21

“We hope it minimizes uncertainties for students as they start residency a few months later,” he added.

Relying heavily on manikins that mimic real human symptoms—including internal bleeding, seizing and cardiac arrest—that require students

to intervene, the class allows students to practice procedures such as intubation, defibrillation and handling emergencies.

“You have to act in the moment,” said **Jeff Butke, MD (MED '24)**, who completed the course this spring and is now an intern at University Hospitals. “Your adrenaline actually starts going and you have to contend with your own physical and emotional reactions.”

Cameras and microphones record students as they practice examination and treatment. Preceptors observe students using two-way mirrors and control the manikin's physical conditions as students choose treatment options.

“These are high-pressure situations that are very close to what would happen with real patients where there could inherently be some discomfort for students,” said Golden. “Students develop a sense of ownership for patient care, reduce errors and become more confident in their clinical reasoning.”

“These are high-pressure situations that are very close to what would happen with real patients.”

— Andrew Golden, MD



The new two-week course—which will become mandatory in 2025 for all University Program students—also emphasizes the physical practice of medicine, such as setting up monitors and devices and interacting with other medical professionals.

In post-simulation debriefing sessions, students reflect on their performance and provide and receive feedback with each other.

“It forces you to sort through uncertainty, but there are guardrails,” said Butke. “It helps us better understand what to improve.”

Layers of learning

All U.S. medical schools must adhere to core educational standards set by the Liaison Committee on Medical Education (LCME) to ensure graduates have a similar foundational knowledge base.

Still, schools differentiate with

unique programs and opportunities. By design, CWRU School of Medicine's curriculum is crafted to blend various learning environments, catering to the diverse learning styles of its students.

“Medical school is not formulaic. We are trying to accomplish the same things but go about it in very different ways,” said **Lina Mehta, MD**, professor of radiology and associate dean for admissions. “We see our students as future colleagues; it's our duty to train them to be the best doctors possible.”

In recent years, the medical school introduced an original educational model known as Gross Anatomy, Radiology, Living Anatomy (GARLA).

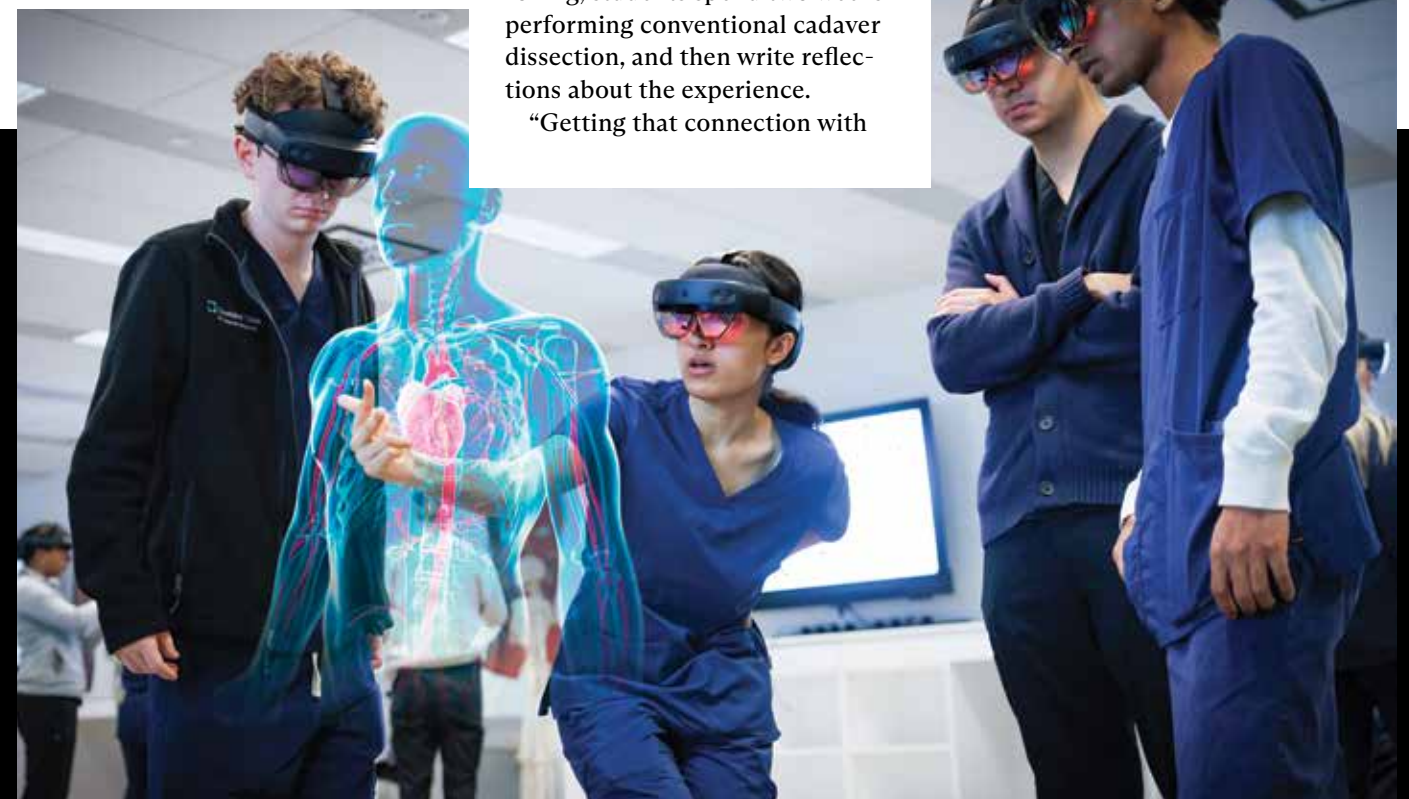
Stretching across the two-year pre-clerkship curriculum, it provides a framework for understanding the mechanisms underlying health and disease. Soon after enrolling, students spend two weeks performing conventional cadaver dissection, and then write reflections about the experience.

“Getting that connection with

their first patient, the cadaver, helps build respect and professionalism they need,” said Logio. “It's a very powerful learning experience as they enter the profession.”

Second-year students mentor first-years in anatomy and radiology basics before rotating through three unique learning experiences. They interpret radiology images, conduct ultrasounds on standardized patients, and use the HoloAnatomy software developed at CWRU's Interactive Commons. Wearing HoloLens headsets, students explore 3D holograms of the human body, studying bones, muscles, nerves and organs in unprecedented detail.

Continued on page 24



For years, medical students have used Microsoft HoloLens—and the university's proprietary software HoloAnatomy—to better understand the inner workings of the human body without a cadaver.

“Our school is known for being at the forefront of teaching medicine in new ways. It’s become our bread and butter that other schools implement what we introduce.”

— Amy Wilson-Delfosse, PhD

Continued from 23

“On its own, HoloAnatomy is innovative, but what’s equally as innovative is combining it with ultrasound and radiology to learn about the exact same anatomical regions,” said **Amy Wilson-Delfosse, PhD**, associate dean for curriculum. “If students can learn subject matter in



Wilson-Delfosse

multiple ways, we see they’re better prepared for clinical practice.”

Pilot studies have found that Case Western Reserve medical students learn anatomy twice as fast with the HoloAnatomy app as they do when dissecting cadavers. The approach has gained national attention, and now more than 20 universities and medical centers around the country are licensing HoloAnatomy from a CWRU-created company.

“Our school is known for being at the forefront of teaching medicine in new ways,” said Wilson-Delfosse. “It’s become our bread and butter that other schools implement what we introduce.”

Climate in the curriculum

The summer before **James Sullivan, MD (MED ’24)**, graduated from Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, smoke from Canadian wildfires blanketed Cleveland and many parts of the Midwest in a thick haze. Poor air quality triggered asthma and related health conditions, especially among vulnerable populations.

“We saw firsthand how climate can affect health in almost every part of the body,” said Sullivan, now a first-year resident in internal medicine at Brigham & Women’s Hospital.

In 2019, Sullivan—then a first-year student—had joined a special steering committee of students, faculty and residents to create the Climate Health Action Curriculum for Lerner College, which is a five-year, research-intensive program within CWRU School of Medicine. Over the next half-decade, CWRU’s Lerner

College became one of the first medical schools in the country to fully integrate the topics into most aspects of its educational approach.

“Climate change has clear implications for clinical practice and healthcare delivery,” said **J. Harry (Bud) Isaacson, MD**, executive dean of Lerner College. “As the effects worsen, there will be more need for healthcare professionals to understand how to address these challenges.”

Rather than adding new content, climate change is integrated into the existing curriculum, with examples woven into both pre-clerkship and clerkship stages.

Students consider patient cases involving how extreme temperatures and pollution spur respiratory conditions, heat-related illnesses and vector-borne diseases. They also study broader public health implications—focusing on social determinants of health worsened by climate change, such as food security, clean water access and displacement from natural disasters.

“Our aim is that students feel equipped to deal with the strain [climate change] will place on people and our health system,” Sullivan said. “Right now, there’s a huge gap in medical education covering these topics.”

Sullivan—whose interest in health was influenced by growing up near a polluted area in Massachusetts designated as an Environmental Protection Agency Superfund site—served as lead author on a paper published in *Academic Medicine* detailing the curricular changes at the Lerner College.

“Other medical schools can see incorporating climate change into their curriculum is possible and help students learn how to navigate these very real complexities,” said Sullivan.

These innovative initiatives are part of a broader philosophy of preparing students for a wide range of future roles in healthcare.

“We want our students to be movers and shakers and understand that part of their job is to make healthcare better across the board,” said Logio. “We do that by preparing physicians to provide the right care for the right patient, at the right time, in the right place.”



Second-year MD students take part in patient screening sessions. Students learn subject matter multiple ways to help prepare them for the rigors of clinical settings. (Photo by Nicholas McLaughlin)

PIONEERING PROGRESS

As one of the first medical schools established in the U.S., Western Reserve University (later becoming Case Western Reserve University) School of Medicine is an early adopter of using full-time faculty for teaching and research, setting a benchmark in the field.



1843

The Western Reserve Curriculum (WRC) is introduced, pioneering the integration of anatomy, physiology, pathology and pharmacology within specific organ systems.

1950s

“It was the most progressive medical curriculum in the country at that time, integrating the basic and clinical sciences. It’s well-known for changing medical education in the decades that followed.”

—Stan Gerson, MD, dean of the School of Medicine



The Institute of Medicine—now the National Academy of Medicine—defined the WRC’s “profound impact...and influence on other medical schools,” as an...

“inspiration which liberated them from the lockstep of conformity.”

Established to train physician-investigators without the pursuit of a MD/PhD degree, the Lerner College does not use grades, class rankings, traditional lectures or final exams. In 2008, it became the first U.S. medical school program to go tuition-free. “There are not many places that offer such a constellation of factors to help us realize our potential. We can explore and discover how to best serve others—as a clinician, colleague, researcher and community member.”

—Helena Baffoe-Bonnie, fifth-year student at Lerner College

1980s

2002

“Offering students the chance to study an interest outside the official curriculum—throughout their time in medical school—is a key investment in making them better physicians and specialists.”

—Lia Logio, MD, professor and vice dean for medical education



A modernized curriculum, WR2, is introduced. Focusing on specific themes across class blocks, thesis research and clinical studies, the approach also emphasizes contemporary physician skills—including reflection, self-assessment and lifelong learning—as well as leadership and civic professionalism.



2006

The Pathways Program is launched, exemplifying a contemporary shift toward specialized, longitudinal learning experiences. The now-nine unique “pathways” are designed to deepen student expertise in global health, climate and health, medical education scholarship and other areas.

2010s

The Sciences and Art of Medicine, Integrated (SAMI) program immerses students in monthly half-day sessions with actors simulating patients, honing their diagnostic and clinical skills. Under clinician guidance, students integrate scientific knowledge with practical care, practicing health histories, physical exams, and reflecting through writing and discussions.

2019

2023

The School of Medicine pioneers the use of Lyceum, a new electronic health record (EHR) platform, for hands-on training with first-year students. This initiative accelerates their familiarity with EHRs, which are used in over 90% of clinical settings but typically not introduced until rotations.

“It’s a low-tech program that is pedagogically among the most innovative approaches we take. The holy grail in medical education is successfully integrating basic, clinical and health systems sciences.”

—Amy Wilson-Delfosse, PhD, associate dean for curriculum at the School of Medicine



In the making

Meet Case Western Reserve's next generation of medical professionals

BY ILIMA LOOMIS | PHOTOS BY MATT SHIFFLER

At Case Western Reserve University School of Medicine, the future of healthcare is being forged one student at a time. These aspiring medical professionals are not just learners—they are the next generation of leaders, innovators and healers, carrying with them a passion for medicine that will shape the future of patient care and medical science. Whether drawn to research, patient advocacy, global health or clinical practice, these students are united by a shared commitment to making a difference in the world. Meet six students across our broad range of program options.



Christian von Harten

Second-year student,
Master of Science in Anesthesia Program

A former Eagle Scout, Christian von Harten was already interested in medicine when he enlisted in the Army Reserve. But he became even more focused after participating in mass-casualty drills as part of a medic unit. He knew he wanted a career that involved service, while also tapping into his love of science.

When he had the chance to shadow a certified anesthesiologist assistant (CAA), he knew that's what he wanted to do. "My favorite thing about it was that you're in charge of the patient while they're asleep," he said.

"You're watching over their life."

Von Harten was drawn to Case Western Reserve because it has one of the oldest and most prestigious anesthesiology programs in the

country. He's been impressed by the intensity of his classes, starting with an "anesthesia boot camp" that

brings new students up

to speed. "It's like there's a waterfall of information coming down at you," he said.

Now on rotations, he said getting the chance to work and learn about different specialties has been exciting and inspiring—and that his U.S. Army training helped prepare him for what was to come.

"They teach you how to communicate and how to work in a team," he said, "which is exactly what a CAA does in the anesthesia care team model."

Chineme Onwubueke

Fifth-year student, Cleveland Clinic Lerner College of Medicine Program and Master of Public Health Program

Chineme “Chichi” Onwubueke remembers studying world maps at a young age and noticing that many African countries, such as her family’s native Nigeria, had indicators for poverty, disease and access to clean water.

“Even as a kid, I knew this [disparity] was wrong,” she said.

Now pursuing two degrees at Case Western Reserve—an MD with special qualifications in biomedical research in the Cleveland Clinic Lerner College of Medicine program and a Master of Public Health—Onwubueke hopes to make a difference with a career focused on global health.

She chose the five-year Lerner College program because of its focus on biomedical research, including a research year in which she focused on studying the immune response to

the yellow fever vaccine in pregnant women.

During her time at Case Western Reserve, Onwubueke helped organize a global health conference on human trafficking and co-leads MamaStrong, a program supporting mothers in the local community at New City Cleveland, a grassroots nonprofit.

She plans to apply for a residency in pediatrics this fall, preferably in a program that trains her for work in global health or resource-poor communities, she said.

Her goal for her career involves not just treating patients, but addressing some of the social and economic issues that contribute to health.

“In medicine, you’re dealing with the intersection of hope and despair, life and death,” she said. “I see a place for myself in that sphere.”





Grant Volpe (GRS '24, medical physiology)

First-year student, MD, University Program

Grant Volpe always thought he would go to medical school after college. So when he didn't get in on his first try, he had to quickly come up with a new plan.

After working in a research lab at a large children's hospital, where he discovered an interest in gastrointestinal pathophysiology, he decided to pursue a master's degree in medical physiology at Case Western Reserve University.

"I knew I still wanted to go to medical school, but I had a deep yearning to learn more about physiology in general," he said. "I thought it would not only be a good opportunity to go deep into my area of interest, but that it would also make me a better physician down the road."

Volpe said a highlight of the program was working with his advisor, assistant

professor of physiology and biophysics **Jessica Taylor, PhD**, who offered support not only with the academics of the program, but also with his future goals.

"The support and guidance I received from her was invaluable, and the opportunity to develop such a relationship with an advisor is quite unique compared to other pre-med focused master's programs," he said.

Volpe graduated in May and is now in his first year at CWRU School of Medicine. "My goals are to advocate for aspiring first-generation medical students, to combat health disparities that affect immigrant populations, and to explore the field of anesthesia and critical care," he said, "so that I may be there for patients during their most vulnerable times."

Landry Cowles

Third-year student, MD, University Program

Growing up in rural Ohio in a family with low income, Landry Cowles never imagined she'd have a career in medicine. Not only did she not know anyone who worked in healthcare, but her family rarely went to the doctor.

Then, as an undergraduate, she volunteered at a sexual assault crisis center. The role involved supporting victims being treated at a local hospital, where she worked alongside emergency responders. It was the first time she considered a career in medicine.

"These people were really vulnerable, and I was in a position to help them," she said. "It felt powerful to know I was able to give them support that they might not have had if I wasn't there."

Later, she returned to do an internship in the emergency room.

Now in her third year of Case Western Reserve's MD University Program, Cowles is inspired by service and giving back.

"I'm very interested in patient health literacy, and empowering patients to become advocates in their healthcare decisions," she explained.

A first-generation college student, Cowles received the Ralph T. and Esther L. Warburton Foundation Scholarship to attend Case Western Reserve. The scholarship program—recently expanded by the Warburton family—aims to create a pipeline of healthcare providers to Northeast Ohio hospitals.

For students who are the first in their family to go to college or attend medical school, imposter syndrome can be a real challenge, she said. Cowles has overcome it by building her own support network, reaching out to faculty mentors and peers and joining a first-generation in medicine club.

Her advice to others forging their own path in medicine?

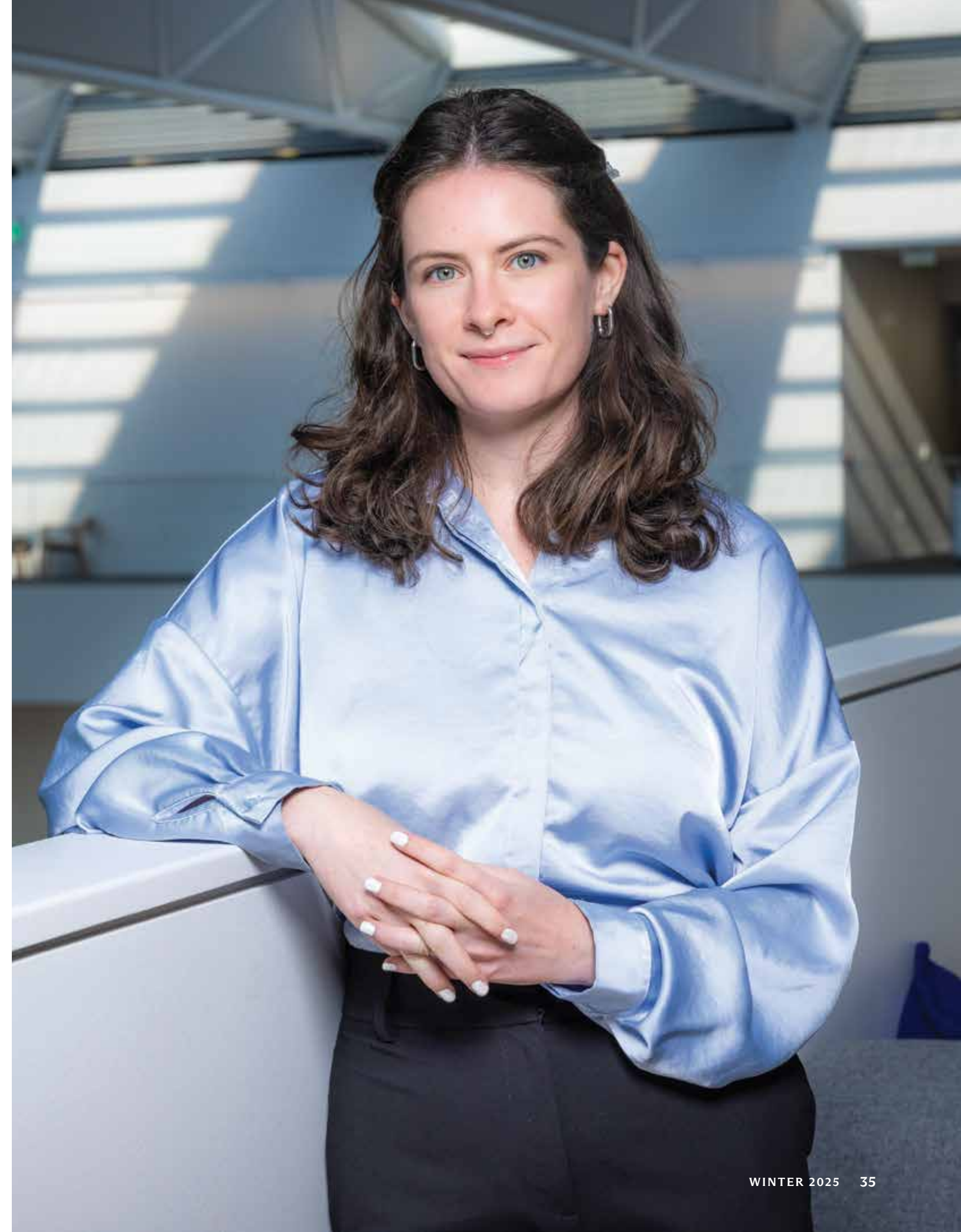
"Trust yourself and have faith in yourself," she said. "You've done a lot to get where you are, and it's where you're supposed to be."

A commitment to the field of healthcare

In 2015, **The Ralph T. and Esther L. Warburton Foundation** made a significant investment to help grow the number of healthcare professionals in Northeast Ohio with the establishment of the Warburton Scholarship Program. With separate endowed scholarships for three schools at Case Western Reserve University—the School of Medicine, School of Dental Medicine and Frances Payne Bolton School of Nursing—the scholarships are awarded to students from families in Stark and Summit counties who have middle-level incomes, but don't qualify for need-based aid and lack the resources to cover tuition.

With \$6 million already committed by 2019, Sally Bonacker Warburton and her husband, Phillip, felt they needed to do more. That's why, in August, they made an additional contribution of \$2.3 million, bringing the overall support for the program to \$8.3 million.

Thanks to the Warburton Scholars Program, 55 students in all—like Landry Cowles—are well on their way becoming a part of the growing community of Northeast Ohio healthcare professionals.





Syrena Bracey

Eighth-year student, Medical Scientist Training Program

Syrena Bracey announced her plans to become a doctor in preschool. But it was a seventh grade summer program geared toward increasing Black and brown students in STEM that introduced her to research.

“I was an inquisitive kid,” she recalled. “Being able to ask a question and figure out how to answer it was super exciting.”

Now in her eighth year of the approximately 10-year Medical Scientist Training Program at Case Western Reserve, Bracey is completing her PhD project on innate immunity and a key protein involved in causing infected cells to self-destruct. Students in the program, a combined MD/PhD that trains future physician

researchers, typically do two years of medical school classroom instruction, spend three to five years on their PhD research project, then complete the clinical portion of their medical degree with hospital rotations.

Bracey says a highlight of her clinical experience so far is seeing Black patients respond to her as a “familiar face,” and tell her they’re proud of her for becoming a doctor. “Representation definitely matters,” she said.

As she dives into rotations this fall, she wants to encourage other students who are from underrepresented groups to pursue their dreams of a medical career.

“If you’re feeling like you can’t do it, look at who’s already here,” she said. “We did it, and so can you.”

Annalise Presutti

Second-year student, Physician Assistant Program

For Annalise Presutti, training for a career in healthcare isn't just about studying different diseases and treatments; it's also about learning how patients live with them—and how healthcare professionals can help. Inspired by a classmate's experience with a chronic condition, Presutti and a fellow Physician Assistant Program student partnered to start Patient Perspectives, which brings patient voices into the classroom.

Patient Perspectives received a grant from the School of Medicine Office of Diversity, Equity, and Inclusive Excellence to help plan events and expand to other graduate and undergraduate programs on campus. Recent panels have included patients with cystic fibrosis, Crohn's disease and sickle cell disease, with topics selected based on

surveys of physician assistant students.

Presutti, who is from Canton, Ohio, has also served as a clinical coordinator of the CWRU Student Run Health Clinic, where students from the medical, nursing, dental and social work schools provide affordable care to area residents.

She said Case Western Reserve's focus on community involvement along with its reputation for academic excellence and a supportive learning environment were why she chose the program.

"The opportunities for service have not only helped me learn more about the community I'm living in and will one day be treating as a provider," she said, "they have also enriched my education and helped me grow as an individual."



Research updates

Breakthroughs from the labs of CWRU School of Medicine

Engineering 'live' replacement joints

About 500 million people globally suffer from osteoarthritis, a degenerative disease in which joint tissues break down over time. Now, backed by an award from the **U.S. Department of Health and Human Services' Advanced Research Projects Agency for Health (ARPA-H)**, a research team led by Case Western Reserve University is working to engineer, grow and commercialize "live" replacement joints to treat this debilitating disease.

The contract will be issued in two phases: \$20.4 million in the first phase, and, if certain milestones are met, \$27.3 million in phase two. Within five years, 40 patients should receive knee replacements with "live" joints, or bio-compatible bone and cartilage grown from human cells that can restore natural function to the joint. The project's goal: to make the treatment available to patients commercially by 2029.



Akkus

Ozan Akkus, PhD (GRS '00, mechanical engineering), a professor of mechanical and aerospace engineering at Case School of Engineering and a professor of orthopaedics at the School of

Medicine, is leading the multi-institution project, "OMEGA: Orchestrating Multifaceted Engineering for Growing



Bonfield

Artificial Joints." The CWRU team is a cross-school effort that includes School of Medicine researchers **Tracey Bonfield, PhD (GRS '87, '91, pathology)**, associate professor of genetics and genome sciences;



Koc

Jane Reese Koc (MGT '08) from the National Center for Regenerative Medicine; **James Voos, MD**, the Charles H. Herndon, MD, Professor of Orthopaedics; **Jacob Calcei, MD**, assistant professor of orthopaedics; and **Ronald Triolo, PhD**, professor of biomedical engineering.



Triolo

"It is an honor to lead an elite group of scientists and clinicians, integrating their vast expertise to regenerate the knee joint, the most complex joint in the human body," Akkus said.

Improving outcomes for colorectal cancer patients

Over the past 50 years, improved treatment methods have helped colorectal cancer survival rates jump from just over 72% to nearly 88%. Thanks to two recent federal grants, Case Western Reserve University School of Medicine researchers aim to improve those statistics even more.



Wang

In one study, **Zhenghe "John" Wang, PhD**, the Dale Cowan-Ruth Goodman Blum Professor of Cancer Research and chair of the Department of Genetics and Genome

Sciences, is leading a team looking to further its earlier published findings of an effective treatment for colorectal and, possibly, other cancers.

This team discovered that combining two chemotherapy drugs (CB-839 and 5-FU) stopped the growth of a type of colon cancer in mouse models that involves PIK3CA—a gene that controls cell growth. They credited the success partly on "neutrophil extracellular traps," or NETs, which trap and kill bacteria.

"We found that patients with tumors that have increased amounts of NETs after the drug treatment survived longer," John Wang said, and "that certain cancer

drugs hijack these neutrophils to kill cancers using extracellular traps. So, our study reveals a new way cancer drugs work, paving the way for the design of new cancer treatments."

The team's continued work, funded through a new \$2 million grant from the **National Institutes of Health's National Cancer Institute (NCI)**, could have a broader impact beyond colorectal cancer, he said, because PIK3CA is mutated in about 20% of all human cancers.

In another study—funded through a five-year, \$1.84 million grant from the NCI—researchers are studying how a protein involved in colorectal cancer growth, LRG1, functions.

LRG1 is extensively dispersed throughout very small, specific areas of many cancers and contrib-



Wang

utes to vascular dysfunction. A team led by **Rui Wang PhD**, assistant professor of surgery, recently discovered that, when secreted from the liver, the protein promotes colon cancer-cell growth—but researchers don't know why.

By identifying and understanding the precise drivers of cancer cell proliferation and survival, Rui Wang said, "we hope to develop new therapies that can block tumor growth and improve outcomes for patients."

A 'significant leap forward' in MS research

In less than a year since CWRU founded the Institute for Glial Sciences, its researchers have partnered to create the largest reported collection of stem cell models from multiple sclerosis (MS) patients—and used it to identify ways in which glia (integral support cells in the brain) contribute to the disease.

Using single-cell gene expression profiling, scientists at CWRU and **The New York Stem Cell Foundation Research Institute** found that stem cell-derived glia cultures from people with primary progressive MS contained fewer oligodendrocytes. Oligodendrocytes produce myelin,

the protective sheath around nerve fibers that is lost in MS.

"This observation challenges the conventional understanding of MS as being purely driven by immune system dysfunction, suggesting that the disease may also be fueled by processes originating within the brain itself," noted Institute Director **Paul Tesar, PhD (CWR '03)**, the Dr. Donald and Ruth Weber Goodman Professor of Innovative Therapeutics, who co-lead the study.



Tesar

"Our findings represent a significant leap forward in our understanding of MS," Tesar noted, "and underscore the vast potential in glia as a target for therapeutic intervention that could transform the treatment landscape for many patients."

A new approach to treating neurodegenerative disease

Growing evidence indicates astrocytes—the brain's most abundant cells—can switch from helpful to harmful, leading to increased nerve-cell loss in neurodegenerative diseases. So CWRU School of Medicine researchers are working to stop these rogue astrocytes from ever forming.

Led by **Paul Tesar, PhD (CWR '03)**, the Dr. Donald and Ruth Weber Goodman Professor of Innovative Therapeutics, and **Benjamin Clayton, PhD**, visiting assistant professor of genetics and genome sciences, researchers found that blocking the activity of the HDAC3 protein may prevent the development of dangerous astrocytes and significantly increase the survival of nerve cells in mouse models.

"Therapies for neurodegenerative disease typically target the nerve cells directly," Tesar said, "but here we asked if fixing the damaging effects of astrocytes could provide therapeutic benefit. Our findings redefine the landscape of neurodegenerative disease treatment and open the door to a new era of astrocyte-targeting medicines."

Research snapshots

The OMEGA grant is among the university's largest in history. But it's just one of the many \$1 million-plus research grants School of Medicine faculty members have received this year. Here's a quick overview; look for updates on their findings in future issues of CWRU Medicine:



Shoag

A \$3.5 million National Institutes of Health (NIH) grant to leverage new sequencing technologies to understand how mutations throughout the lifespan may be associated with the risk of aging-related diseases such as cancer.

Lead investigator: **Jonathan Shoag, MD**, associate professor of urology.



MacFarlane

A five-year, \$2.8 million NIH grant to investigate Sudden Infant Death Syndrome's causes—and determine possible treatments. Lead investigator:

Peter MacFarlane, PhD, associate professor of pediatrics.



Matsuyama

A three-year, \$1.5 million grant from the Foundation Fighting Blindness to test a possible breakthrough drug that may address retinitis pigmentosa, which causes blindness when photoreceptors in the retina die. Lead investigator:

Shigemi Matsuyama, PhD, DVM, associate professor of ophthalmology and visual sciences.

RESTORING

C O N N

As Ron Triolo, PhD, turned up the nerve stimulator in his lab at the Louis Stokes Cleveland Veterans Affairs Medical Center, the research trial participant connected to the machine immediately perked up.

“That’s my big toe!” he said. “If I had a big toe.”

The trial participant—a military veteran who had lost his leg after stepping on a landmine in Vietnam 50 years ago—was like so many others Triolo, a professor of orthopedics and biomedical engineering at Case Western Reserve University School of Medicine, has worked with across more than 25 years. They are paralyzed by spinal cord injuries, stroke or multiple sclerosis, or they’ve lost limbs. But they haven’t lost hope.

Neither has Triolo.

As executive director of the U.S. Department of Veterans Affairs’ Advanced Platform Technology Center, Triolo has overseen the design, prototyping and production of novel medical devices for the rehabilitation of people with sensorimotor impairments or limb loss. He conducts research on the development and clinical application of neuroprostheses and restorative technologies, biomechanics and the control of movement, rehabilitation engineering and assistive technology.

For people like the military veteran, Triolo and his research team have used implanted electrodes to stimulate sensory nerves associated with lost limbs, which then carry a message to the spinal cord and brain that generate perceptions of sensation related to what the missing limbs would be feeling if

E N

C T I O N

Research shows promise for individuals with life-altering injuries

they were still there. “It’s like a pacemaker for your nerves or muscles,” he explained. “We kind of fool the brain into thinking the stimulation of the nerves can elicit a perception of touch or pressure related to the phantom limb. The user can feel their ‘phantom’ feet touching the floor and tell how much pressure is being placed on it at

various locations from the heel to the toes. This makes a big difference to the ability to balance, walk over different surfaces or adjust walking speed without looking at—or paying a lot of attention to—the prosthesis.”

With this technology, Triolo and his

Continued on page 44

S



Ron Triolo (right) and Alexander Richards (center) explain nerve stimulation to a clinical trial participant (left). (Photo by Matt Shiffler)

Continued from 43

team of investigators have enabled people with paraplegia to rise from their wheelchairs, and even walk short distances with little or no assistance.

“I don’t like to say we’re restoring function, sensation or the ability to stand,” he said. “What we’re doing is giving people an option to stand, step or interact with the world differently than they would have before their injury. That option was off the table until our technology became part of their lives.”



Triolo



“What we’re doing is giving people an option to stand, step or interact with the world differently than they would have before their injury.”

— Ron Triolo, PhD

STIMULATING DISCOVERIES

Triolo’s work with amputees grew out of earlier research—still ongoing—in which he aims to improve life for people with spinal cord injuries by enabling exercise.

People with spinal cord injuries—which cause paralysis—are at elevated risk for heart attack, heart failure and atrial fibrillation, researchers reported in *Journal of the American College of Cardiology* earlier this year. And because paralysis leads to immobility, they’re not likely to get the level of cardio exercise they need to help avoid these problems.

“Sitting kills, moving heals, right?” Triolo said. “But if you’re paralyzed, you don’t have many options to exercise.”

So, he thought, how could he help people with paralysis ex-

ercise with more intensity and cardiovascular benefits?

Stimulation-based rowing and cycling has been around for several years, but Triolo saw an opportunity to perfect them.

To achieve a more effective rowing and cycling pattern, he placed sensors on the handles and pedals, which allows the nerve stimulator to fire in time with the movement to contract the right muscles at the right time. This technology allows the user to exercise their otherwise dormant muscles, which are still healthy and capable of movement—just severed from the message centers of the nervous system.

The result: The user feels more “at one with the machine” while reaping all the well-understood benefits of cardiovascular exercise, including on mental health.

FROM LAB TO LIVING ROOM

With 10 participants now in the study, this project is growing and attracting a lot of attention—including from a few medical students.

Alexander Richards, a member of the CWRU Crew team, met Triolo at the Cleveland Rowing Foundation boathouse at the end of his first year in medical school. He saw two trial participants using the adaptive rowing machines at the lab and told Triolo, “If I didn’t know, I’d think they were about to head out for a row on the river!”

Richards, who competed in the 2021 Olympics in Tokyo as a member of the U.S. Men’s Eight rowing team, is now a third-year MD student. He loved the

combination of science and sport—but especially that it made rowing more accessible.

“These participants, who had minimal or no control over their lower limbs, were rowing full strokes with their arms, backs and legs,”

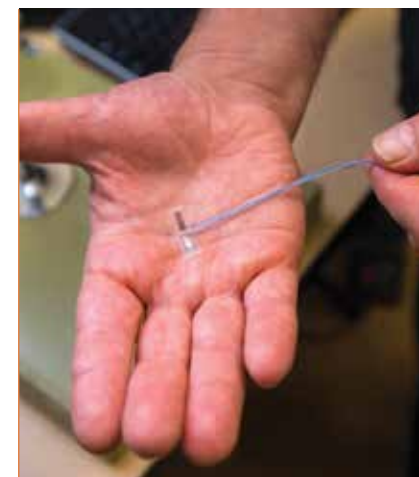
Richards recounted. “Aside from the wires and stimulation pads attached to their quads and hamstrings,

one would have a hard time knowing the extent of their injuries.”

This year, Richards will be working in Triolo’s lab, where he hopes to conduct his own study that compares



Richards



“It’s like a pacemaker for your nerves or muscles. We kind of fool the brain into thinking the stimulation of the nerves can elicit a perception of touch or pressure ...”

— Ron Triolo, PhD

the biomechanics of nonstimulation-based rowing with stimulation-based rowing.

Triolo hopes to involve even more students in the years ahead, especially as they expand the capabilities of assistive technology. That includes building virtual reality platforms so people can row on the river or in teams—from the comfort of their homes. They’re also experimenting with e-bike prototypes that use tilt sensors to assist riders with inclines.

“If we can put [these machines] in people’s homes or organize a para-rowing club so people with disabilities can get out on the water and exercise, have fun and build a community,” he said, “that’ll make everybody healthier—including our society.”

—Lauren Marchaza



Alexander Richards (left) and Ron Triolo (right) observe a clinical trial participant (center) using the adaptive rowing machine. (Photos by Matt Shiffler)

AI's expanding role in modern medicine

BY
ALAINA
BARTEL

FROM DATA TO DIAGNOSIS

PRECISE SOLUTIONS

Artificial intelligence (AI) is often touted as the solution to countless challenges across industries. But for **Rong Xu, PhD (GRS '99, biology)**, the potential of AI lies not in its broad application, but in its precision.

The bioinformatics professor's strategy is a departure from the traditional "hammer and nail" mentality that pervades much of AI-driven research. Rather than developing algorithms first and seeking problems to solve, her team begins with pressing biomedical questions—whether understanding the underlying mechanisms of a disease, discovering new drugs or assessing public health policies—and specifically crafts AI tools to answer them.

Xu's fascination with AI is fueled by the unprecedented data now accessible to researchers, from genetic and genomic information to cellular and patient-level data—and even population-level trends. For instance, in recent studies on semaglutide—a drug used for diabetes and obesity through products such as Ozempic and Wegovy—Xu's team analyzed vast amounts of data and revealed its potential to reduce Alzheimer's risk and addictions such as alcohol use and smoking, among many other headline-making connections.

In the future, Xu believes AI will continue to unlock new insights from complex datasets, leading to more innovative treatments and better health outcomes.

"There are so many emerging problems—environmental health, pandemics, the opioid epidemic—where our understanding is still limited," she explained. "AI will continue to play an increasingly important role in tackling these challenges, helping us to better understand diseases, discover new treatments and, ultimately, improve human health and well-being."

RONG
XU



FIGHTING RESISTANCE

Jacob Scott, MD (MED '08), is using AI to tackle one of the toughest challenges in medical science: drug resistance. In his lab, AI is more than a tool—it's a game-changer.

An associate professor of molecular medicine, Scott is on a mission to understand and combat drug resistance in cancer and pathogens—an intricate process characterized by countless variables and unpredictable outcomes.

"As a laboratory studying the evolution of drug resistance, we are often faced with incredibly complex, high-dimension data that changes over time," Scott explained. "As cancers and pathogens evolve resistance, they change in shape and mutate, gaining new properties."

Scott's laboratory team employs AI to simplify and analyze vast amounts of genomic data, a task that would otherwise be overwhelming for traditional methods, such as manual data sorting and data visualization. By developing advanced optimization algorithms, his team aims to slow down or even reverse the troubling trend of resistance evolution. In a recent study, Scott and his colleagues found that interactions between resistant and non-resistant cells may explain how resistance survives in diseases like cancer, pathogens and parasites.

"In a world where the tools we have for data science and analysis are increasingly less able to handle the data types we are able to measure," he continued, "we are leaning more and more on AI methods to help bridge the gap."

Like all fields, Scott expects AI to continue to disrupt the way we approach healthcare.

"We are just now learning to incorporate the power of AI into our daily lives, and it is difficult even to imagine where that will take us in the coming years," he said.

JACOB
SCOTT



IMAGING INSIGHTS

Imagine a future where AI not only complements physicians' expertise but transforms medical care by analyzing complex data, predicting disease progression and guiding personalized treatments. **Satish Viswanath, PhD**, associate professor of biomedical engineering, leads a lab at the forefront of this revolution.

Viswanath and his team are creating AI algorithms that decode complex medical images (magnetic resonance imaging, computed tomography and positron emission tomography scans) in an effort to revolutionize how diseases are diagnosed and treated. By examining detailed images of tissues or organs, Viswanath's algorithms can identify biomarkers that indicate how a disease is likely to progress or respond to a particular treatment. This capability is crucial for enabling the tailored treatments of precision medicine. At present, Viswanath is using the technology to improve rectal cancer treatment.

Viswanath's team has further examined how to account for differences between sites, scanners and acquisition parameters to ensure generalizable performance of AI tools and computational imaging features—crucial for broader clinical translation and widespread adoption.

"We are just scratching the surface with regard to the potential of AI in the field of medicine," said Viswanath. "AI technologies are relatively nascent in terms of what kinds of problems they are being applied to and the types of information we have been able to extract from medical data."

SATISH
VISWANATH



Alumni and friends

School of Medicine's newest alumni start next chapter



This year's MD diploma ceremony—special for many graduates because their undergraduate commencement and white coat ceremonies were held virtually due to the pandemic—was held in person at Severance Music Center.

BEGINNING'S END

Extensive training, critical hands-on experiences and invaluable mentorship prepared the Case Western Reserve University School of Medicine Class of 2024 to become healthcare leaders and innovators. In May, that preparation paid off during Commencement Week as graduates celebrated the end of their medical education journeys during Commencement Week. Here's a quick glimpse into some of the memories made.

209 total Doctor of Medicine graduates in the class of 2024:

72 Master of Science in Anesthesia	27 Master of Public Health
35 Physician Assistant	31 PhD

- 162 University Program
- 33 Lerner College Program
- 11 Medical Scientist Training Program
- 3 Doctor of Medicine in Dentistry

“Commit your purpose, for you all are giants. Don't let anyone tell you otherwise.”

—Monica Lypson, MD (MED '96), Rolf H. Scholdager Professor of Medicine at Columbia University Irving Medical Center and vice dean for medical education, Columbia University Vagelos College of Physicians and Surgeons



The School of Medicine's Class of 2024 kicked off Commencement Week by striding across Case Quad—flanked by family, friends, faculty and staff applauding their achievements—and was followed by commencement ceremonies later in the week. (Photos by Matt Shiffler and Annie O'Neill)

HOMEcoming AND REUNION WEEKEND

Accomplished alumni

2024 School of Medicine alumni and achievement award winners



James W. Brodsky, MD
(MED '79)
Distinguished Alumni Award (MD category)



Michael Lobritz, MD, PhD
(GRS '07, molecular biology and microbiology; MED '09)
Distinguished Alumni Award (PhD or MD/PhD category)



Christopher P. Brandt, MD
(WRC '80, MED '84)
The Clifford J. Vogt, MD '34 Service Award



Carl A. Robson, MD
(MED '66)
Special Recognition Award



Paige Cramer Lacatena, PhD
(GRS '12, neurosciences)
Early Career Leadership Award



George Picha Jr., MD, PhD
(GRS '74, '76; MED '80)
Lifetime Achievement Award



Wanda Cruz-Knight, MD
(MED '97)
Robert L. Haynie, MD '78, PhD '72 Diversity, Equity and Inclusion Award



Belinda Yen-Lieberman, PhD
Honorary Alumnus of the Year Award

▶ Know someone deserving of these honors?
Nominate them by emailing somalumni@case.edu.



LOOKING BACK—AND FORWARD

Reminiscing about the past, learning about the future at Homecoming and Reunion Weekend

When they were students, interactive escape rooms and artificial intelligence were something that many Case Western Reserve University School of Medicine alumni couldn't even imagine.

And it certainly wasn't something they'd ever consider to be part of medical education.

But that's exactly what they saw when they toured the Zubizarreta Immersive Learning Suite and Simulation Center at their alma mater during Homecoming and Reunion Weekend in November.

While many alumni marveled at the advances in medical education at the Sheila and Eric Samson Pavilion (top right), others reconnected at the annual MedConnect Mentoring and Networking Brunch, or the Dean's Distinguished Lectures, featuring keynote speakers **Richard Woychik, PhD (GRS '84, molecular biology and microbiology)**, director of the National Institute of Environmental Health Sciences, and **Gary E. Beven, MD (MED '89)**, chief of the Space Medicine Operations Division at NASA Johnson Space Center.

Past met present when both alumni and students gathered for the annual Dean's Welcome Back Soirée, which featured the 2024 Medical Alumni Awards (bottom right).



Photos by Andrew Jordan

Class notes

Includes alumni information reported to Case Western Reserve from Oct. 20, 2023, to July 10, 2024.

1940s

Nancy Kurfess Johnson (FSM '49; MED '54; GRS '98, bioethics) received the **Academy of Medicine of Cleveland and Northern Ohio** Legacy Award for dedicating a half-century of service to the field of medicine. Notably, in 1977, she became the first woman board-certified OB-GYN to establish a private practice.

1950s

Abe Bergman (MED '58), who died in November 2023, received a posthumous Washington Medal of Merit for his work in child safety rights advocacy. Bergman, who worked as a professor and pediatrician in Seattle, helped pass separate pieces of legislation that required manufacturers of children's sleepwear to make their products flame-retardant, mandated the sale of child-proof medication containers and gave the **Eunice Kennedy Shriver National Institute of Child Health and Human Development** the responsibility to oversee Sudden Infant Death Syndrome research.

1960s

Robert J. Baumann (MED '65), of Lexington, Kentucky, received the Roger and Mary Brumback Lifetime Achievement Award from the **Child Neurology Society**

for dedicating more than five decades to the field of pediatric neurology. He is chief of the division of pediatric neurology at **UK HealthCare**, the University of Kentucky's healthcare system.

1970s

Steven Keenholtz (ADL '72, MED '76), of Marblehead, Massachusetts, received the 2024 Lifetime Achievement Award from **Essex County's Southern District of the Massachusetts Medical Society**. Keenholtz was the first board-certified infectious disease specialist practicing in Essex County; his career has spanned four decades.

Steven Altschuler (WRC '75, MED '79), of Oakley, Utah, was named chairman of the board of directors of **ViaNautis Bio**, a nanomedicine company that develops genetic therapies. Altschuler, an emeriti trustee of CWRU, is managing director-healthcare ventures at the investment firm **Ziff Capital Partners**, where he coordinates support for biomedical companies.

1980s

Bill Schwab (MED '80) received the Chancellor's Award for Excellence in Leadership from the Department of Family Medicine and Community Health

at the **University of Wisconsin School of Medicine and Public Health**. Schwab was honored for his advocacy for patient-centered care as well as his leadership of federally supported projects to advance developmental screenings and primary care for people with autism.

David Scadden (MED '80, HON '19)

joined the board of directors of the biopharmaceutical company **Carisma Therapeutics**. Scadden leads the Center for Regenerative Medicine at **Massachusetts General Hospital** and the Harvard Stem Cell Institute at **Harvard University** and is chairman emeritus and professor of the Harvard University Department of Stem Cell and Regenerative Biology.

Nicholas Rosenlicht (MED '84) recently published a book, *My Brother's Keeper*, which seeks to reshape the perception of mental healthcare and its connection to broader social and economic issues. Drawing on more than 40 years of clinical and research experience, he provides solutions for creating a more caring and effective approach to healing.

Bernhardt Zeiher (MED '89) was named a member of the board of directors of **Amylyx Pharmaceuticals**, a Cambridge,



Have a new job? Earn an award? Recently marry, have a child, retire or travel the world? We'd love to hear from you! Share your updates with us at case.edu/medicine/alumni.

Massachusetts, company that develops therapies for neurodegenerative diseases. He worked for the drug company **Astellas Pharma** from 2010 to 2022, most recently having served as chief medical officer.

1990s

Steven Kelly (MED '93) was named chief medical officer for **Aultman Health Foundation**, a nonprofit healthcare organization that serves Stark County, Ohio, and surrounding areas. Kelly is a surgeon with **Aultman Hospital**, where he has served since 2002, and was most recently the organization's system medical director for surgical services.

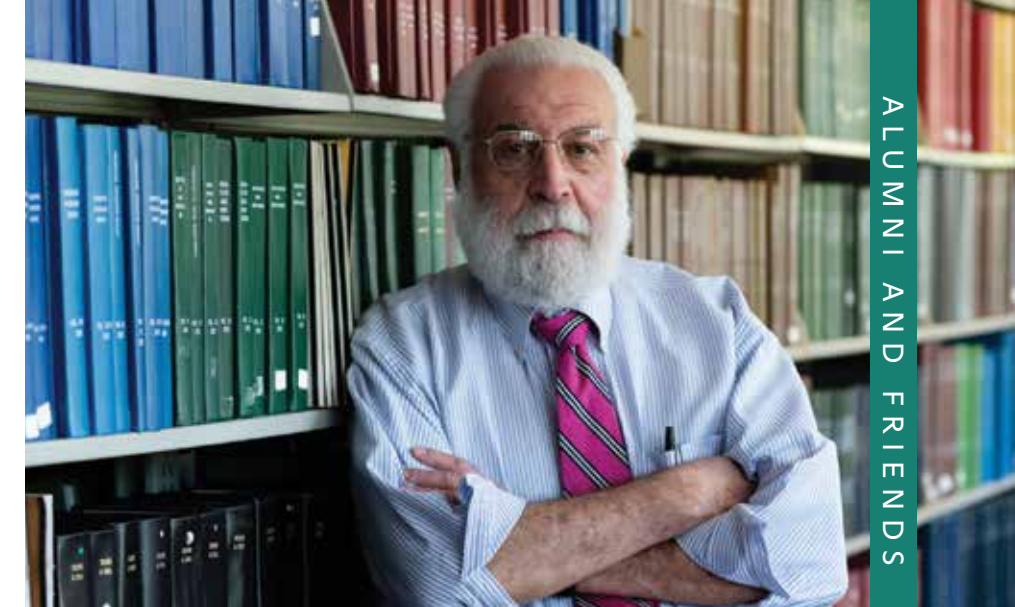
Maxime Gilles (MED '93) was appointed to the board of the **Morris Hospital and Healthcare Centers** in Morris, Illinois.

Byron Thomas (MED '97), of South Bend, Indiana, was named to the **Brunswick (Ohio) High School** Distinguished Alumni Hall of Fame for his work in family medicine, mentorship of nurse practitioners and service as an elder at **Sunnyside Presbyterian Church**.

Amit Patel (MED '98), of Miami, is lead medical advisor for **BeatBio**, a company that develops cardiovascular therapies.

2010s

Andrew Dang (MED '12), of Plain City, Ohio, was named a 2024 Top Doctor by **Castle Connolly**, a healthcare research and information publishing company that releases an annual list of the United States' top physicians. He is medical director of **Premier Allergy & Asthma**, a network of clinics in the Columbus, Ohio, area, and specializes in allergies and immunology.



Honoring medical faculty legacies

Nathan Berger, MD, who served as School of Medicine dean from 1995 to 2002 and was a Distinguished University Professor, died June 15. He founded the National Cancer Institute-designated Case Comprehensive Cancer Center, which comprises thousands of researchers and healthcare professionals from Case Western Reserve, Cleveland Clinic and University Hospitals. For more than 40 years, Berger produced groundbreaking biomedical research into cancer development and its associated risk factors. He was a well-regarded hematologist at University Hospitals, a nationally renowned authority on hematology and oncology, and a mentor, teacher and role model who built a legacy as an advocate for students with backgrounds typically underrepresented in science and medicine.

Charis Eng, MD, PhD, professor and vice chair of genetics and genomic sciences, died Aug. 13. Eng was also chair and founding director of Cleveland Clinic's Genomic Medicine Institute, as well as founding director and attending clinical cancer geneticist of the institute's clinical component, the Center for Personalized Genetic Healthcare. She discovered what is now known as phosphatase and tensin homologue hamartoma tumor syndrome, which is associated with a high incidence of breast, thyroid and other cancers, and is the most common genetic cause of autism spectrum disorder.

Nahida Halaby Gordon, PhD (GRS '80, mathematics), professor emerita in probability and statistics, died June 21. Gordon taught at the School of Medicine and the Frances Payne Bolton School of Nursing for more than three decades, and published more than 100 scholarly articles on biostatistics. She was also a senior Fulbright Scholar at Birzeit University, Palestine, and the author of *Palestine is Our Home: Voices of Loss, Courage, and Steadfastness*.

Robert Salata, MD (MED '79), infectious disease professor, physician and researcher at the School of Medicine and University Hospitals, died Aug. 26. In his 36 years on the faculty of Case Western Reserve, Salata was the John H. Hord Professor and chairman of the Department of Medicine and founding director of the Infectious Diseases and Immunology Institute and principal investigator in HIV/AIDS research for the Uganda-Case Western Reserve University Research Collaboration. More recently, Salata led the clinical trial for the Pfizer COVID mRNA vaccine in Northeast Ohio.

Barbara Freeman, MD, PhD, longtime professor of anatomy at the School of Medicine, died July 25. Late in her career, Freeman was especially passionate about collaborating in the development of CWRU's Microsoft HoloLens augmented reality project, and was honored last year during the university's Innovation Week with the Commercialization Award for her work on the university's HoloAnatomy curricular software.

In memoriam

Information reported to Case Western Reserve from Oct. 20, 2023 to July 10, 2024.

1940s

James W. Craig (ADL '43, MED '45)
I. Justin Kleaveland (MED '47)

1950s

Sheldon Gaylin (MED '53)
Ray C. Otte (MED '56)
Abba I. Terr (ADL '52, MED '56)

1960s

Robert E. McGaughy (GRS '61, '66)
Priscilla Ann Gilman (MED '62)
Charles C. Schock (MED '62)
Tom H. West (MED '64)
Sidney M. Wolfe (ADL '60, MED '65, HON '94)
Edgar B. Jackson Jr. (CLC '62, MED '66)
Russell G. Durkovic (GRS '68)

1970s

Wayne D. Beveridge (MED '71)
James F. Bright (MED '71)
Joanne L. Lahiff-Jaffe (GRS '76)
Dr. Joseph P. Crowe Jr. (MED '78)

1980s

Robert G. MacBride Jr. (GRS '81)
Mark Joseph Koris (MED '82)
Ira Jay Ungar (GRS '82, MED '84)
Gwen Karen Glazer (MED '84)
Alan Jonathan Waldman (MED '86)

2000s

Evelyn Mentari (CWR '95, MED '00, GRS '06)
Ruta Ravindra Nene (CWR '98, MED '02)
Thomas Robert Breen (MED '05)

IN OUR COMMUNITY

The power of poetry

School of Medicine student uses her many talents for good

As Cleveland native **Honey Bell-Bey** finished reciting her poem, “The Transformational Power of Art,” at the U.S. Conference of Mayors in Washington, D.C., on Jan. 19, 2024, the leaders who filled the room got to their feet to deliver a standing ovation.



“I just got blessed,” **Cleveland Mayor Justin Bibb (LAW ’18, MGT ’18)** told the crowd after she finished. Moments before, Bibb had introduced Bell-Bey, whose work was being honored with the National Citizen Artist Award from Americans for the Arts and The United States Conference of Mayors.

The honor was one more to add to a long list of Bell-Bey’s titles, among them: grassroots community activist, author, substance abuse prevention expert, performance troupe director and Cuyahoga County Poet Laureate.

In 2022, she added a new title to the list: Master of Public Health student at Case Western Reserve University School of Medicine.



Watch Bell-Bey’s ovation-inducing performance of “The Transformational Power of Art” at the mayors’ conference.

Although she had dedicated decades to addressing the needs of marginalized communities, Bell-Bey had never categorized her work as “public health” until meeting Case Western Reserve Professor Emeritus **Scott Frank, MD (GRS ’84, family medicine)**.

“He helped me see how everything is public health,” she recalled. “He inspired me to remain in the program. If you remove gender, if you remove age, if you remove race...I don’t think I’ve ever met more of a kindred soul in my life!”

Motivation from Frank—who retired from the School of Medicine in June 2023 after more than 40 years—is the reason Bell-Bey strives for straight As and will press on as the program becomes more rigorous.

She is taking her time earning her Master of Public Health degree, though, as her activism in East Cleveland keeps her very busy—from transforming an abandoned field into an outdoor movie space to combating food desert concerns by supplying residents with planter boxes for vegetable gardening.

After she graduates, Bell-Bey said she’ll use her degree to bolster the work she’s already doing. Poetry, she said, will continue to play a big role in that: It’s a tool she uses to unite people around social justice and equity and to make public health easier for people in her community—and well beyond—to understand.

“The United Nations doesn’t have a poet laureate, so I could start that,” said Bell-Bey confidently. “What a powerful position for this little Black girl from East Cleveland to be in!”

—Lisa Sweeney

MARK YOUR CALENDAR

Join us in giving back on April 8!

On April 8, during Case Western Reserve University’s annual Day of Giving, make a difference by supporting the School of Medicine programs you care about. Support a variety of funds and initiatives, including the *Jason Madachy Foundation* and the *CWRU School of Medicine Alumni and Friends Stethoscope Award*.

Your gift to this fund will provide stethoscopes to first-year medical students. Keep an eye out for more information in your email!

Contact us with questions or updates to your mailing address at somalumni@case.edu or 216.368.6165.



CASE WESTERN RESERVE UNIVERSITY
School of Medicine



CASE WESTERN RESERVE
UNIVERSITY
School of Medicine

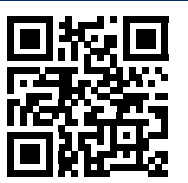
10900 Euclid Ave.
Cleveland, OH 44106-7017

UMC-5396-01_2024

Support students, *drive innovation*

Gifts to Case Western Reserve University School of Medicine's Catalytic Fund provide essential resources to educate a talented student body, support our renowned faculty in groundbreaking biomedical investigation and mentorship and **advance our mission to improve global health by linking research to populations in a superb educational environment.**

By making a multi-year commitment, you provide extra stability—allowing us to plan for the future and ensure a lasting impact.



To make a gift today, please visit
giving.case.edu/med or call **216.368.6165.**



CASE WESTERN RESERVE
UNIVERSITY

