CF: Quest for a cure
The Catalytic Fund, The School of Medicine Annual Fund provides the school the flexibility to respond to needs and opportunities that may otherwise go unaddressed because of competitive federal funding, or difficulty in attracting support for specific programs.

Gifts to the fund provide critical assistance to the school to achieve its mission to attract and train the best students, translate discoveries from the labs to the patients, and improve the care and health of our community.

Thanks to an anonymous alumni couple’s generous pledge, all gifts up to $250,000 made to the Catalytic Fund will be matched, dollar for dollar again this fiscal year. This means your gift will provide double the impact for the School of Medicine.

Your gift supports critical areas such as:
- Retention of talented faculty
- Scholarships to attract top students
- Student activities such as Doc Opera
- Pilot funds for new educational programs and pathways
- Support for students to travel to underserved countries

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Celebrating our 175th anniversary
A message from the dean

Searching for solutions
Developing new knowledge in biomedical research

Advancing the future of medicine
Celebrating 175 years of medical education and innovation

CF: Quest for a cure
To find a cure for cystic fibrosis, collaboration is key

Data vs. disease
Betting on big data to defeat Alzheimer’s disease

Cultivating compassion
Empathy for patients begins with teaching a better way to communicate

Inside initiatives
Programs that reflect our mission

Education in action
Students addressing community needs

Honors and accolades
Recognizing our faculty

Left brain | Right brain
The art of science
Party Like It’s 1843!

Case Western Reserve University School of Medicine is proud to kick off our 175th anniversary with a year of events that reflect on our strong history and enduring legacy in education, research and community health. Check your mail for opportunities to join us for these special events throughout the year.

And mark your calendars for November 1, 2018, as we honor our past, celebrate our present and toast to our future at our official 175th Anniversary 1843 Society Gala!

About Medicus

Medicus is the biannual magazine of Case Western Reserve University School of Medicine. This magazine and the stories within are intended to bring to life the school’s threefold mission: excellence in medical education, advancing discoveries from laboratories to patients, and improving the health of the community.

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Case Western Reserve University School of Medicine
Office of Marketing and Communications
2109 Adelbert Rd., WG37, Cleveland, Ohio 44106-4961
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School of Medicine
Pamela B. Davis, MD, PhD
Dean, School of Medicine
Senior Vice President for Medical Affairs, Case Western Reserve University

Marc Kaplan
Associate Dean for Marketing and Communications

Lindsay Lodge
Managing Editor
Communications Coordinator

Jennifer Roffey
Digital Content Manager

Ansley Gogol
Associate Communications Specialist

Design:
Nesnadny + Schwartz

Writers:
Gay Eyerman
Mark Gaige
Scott Harris
Jennifer Michalowski

Photographers:
Angelo Merendino
David Schwartz
Laura Travis

On the cover:
Inhalation therapies benefit patients with cystic fibrosis.

Cover photo by:
Angelo Merendino

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Welcome to the re-launch of *Medicus*, the School of Medicine’s flagship publication. Twice a year, its pages will bring to life the contributions of our faculty members to biomedical education and research and introduce you to our inspiring students. The magazine’s rebirth is timed to coincide with the school’s 175th anniversary, an ideal opportunity to reflect on our rich history of innovation.

Our commitment to teaching students to think like doctors first attracted outside attention in 1910 when Abraham Flexner, in his influential assessment of the era’s approach to medical education, tagged our school as an intellectual leader, citing the then-uncommon practice of incorporating empirical scientific knowledge into the curriculum. Following publication of the Flexner Report, an expectation took hold that medicine should take into account empirical evidence, radically shaping the profession to this day.

Equally pioneering was our emphasis on inclusivity in training new physicians. By 1865 our school had graduated six of the first seven women in the United States to earn medical degrees from a recognized medical school. That same year, Charles B. Purvis, MD, became only the third African American to do so. More recently, the AAMC named us among the top 15 schools for graduating African American physicians into the profession.

In 1952, we redefined medical education by focusing on organ systems, integrating clinical and basic science, and introducing students to patient contact in their first year. Another signpost occurred four years later when MSTP became the first combined MD/PhD program, serving as a worldwide model. In 2004, we launched the innovative Cleveland Clinic Lerner College of Medicine track within the School, aimed at producing physician-researchers. The year 2006 saw the appearance of the WR2 curriculum in the University Program, uniting medicine and public health in a single, integrated program. It allows students to identify critical interactions between the biology of disease and social and behavioral contexts of illness — and between the care of individual patients and the broader health of the public.

Our contributions to medical research have been just as impressive, including seminal advances in public health, cardiology, pediatrics, infectious disease, genetics, and hematology. It’s only possible to cite a few. In 1912, Roger Perkins, MD, developed a process for chlorinating drinking water, a crucial step in eradicating typhoid bacilli. Between 1935 and 1955, Claude Beck, MD, pioneered stunning advances in cardiac care including the first surgical treatment of cardiovascular disease and the first successful defibrillation of the human heart. In 1953, Frederick Cross, MD, and Earle Kay, MD, developed the first heart-lung machine for use during open-heart surgery. Twenty years ago, Huntington Willard, PhD, led a team that developed the first artificial human chromosome, a powerful new tool in the study of human genetics.

That tradition continues today. We are partnering with Microsoft to integrate enhanced reality imaging to give students (and faculty members) a bold new look at human anatomy. The new Health Education Campus, due to open in the summer of 2019 and built together with Cleveland Clinic, will bring together students from the schools of medicine, nursing, dental medicine, and social work under one roof, allowing them to learn from each other and provide care as a team. Discoveries emerging from our laboratories continue to generate new knowledge in cancer, infectious disease, vision, digestive health, regenerative medicine, genomics and brain health — through novel uses of imaging, nanotechnology, big data and more.

The past 175 years have shown Case Western Reserve University School of Medicine to be an exciting, innovative place to teach, learn and discover. *Medicus* will help illuminate the many ways we are building on this vibrant tradition, improving the health of patients in Cleveland, the U.S., and throughout the globe.
DERMATOLOGY: Harnessing vitamin D to protect against mustard gas

Kurt Lu, MD

Despite an international ban on its use in 1925, mustard gas is still a threat. Last year, rockets containing mustard gas are thought to have been fired in conflict regions in the Middle East. In the Nordic states, fishermen are at risk of exposure to chemical weapons, including mustard gas, dumped into the ocean after the Second World War.

Exposure and inhalation to blistering agents such as mustard gas can cause severe damage to the skin, respiratory system, and internal organs, potentially leading to death. Contact with the eyes can result in sensitivity to light, cornea injuries and loss of vision. To date, there is no antidote.

The search for effective countermeasures against blistering agents, otherwise known as vesicants, like mustard gas, is the focus of research by Kurt Lu, MD, assistant professor of dermatology at Case Western Reserve University School of Medicine. Lu has been exploring how to modify the immune system’s response to blistering agents using vitamin D, which is naturally present in a few foods, but also produced when the skin is exposed to sunlight.

Direct exposure to a vesicant results in a “first hit” injury to the skin, unleashing a surge of bodily activity culminating in activation of innate immune responses. Inflammatory macrophages — white blood cells that gulp down foreign particles — are mobilized to the injury site where they carry out a devastating “second hit” to the tissue. In other words, the body begins damaging its own cells, magnifying the harm from the chemical agent itself. This secondary destructive skin response results in delayed wound healing and increases the risk of serious infection.

The damaging effects of second hits are not restricted to the skin and can encompass the eyes, lungs and liver.

“In the event of mass exposure, attempts at decontaminating or neutralizing vesicants will not adequately address acute tissue injury since the first hit occurs so rapidly,” says Lu. “However, blocking activation of the macrophages will help prevent progression into catastrophic skin erosions and may be a feasible countermeasure strategy, since the second hit typically occurs 6 to 24 hours after exposure, giving time for medical intervention.”

For the past several years, Lu, who earlier this summer published a globally-cited study showing that a single large dose of vitamin D can be an effective remedy against severe sunburn, has been testing his hypothesis by using high-dose oral vitamin D3 to thwart activation of the macrophages. While focusing on the skin, Lu notes that positive findings may generalize to the eyes and internal organs as well. This work has proved so promising that he has received a second five-year Countermeasures against Chemical Threats — CounterACT — grant from the National Institutes of Health to expand his investigations.

Using surrogate chemicals, the new study will test whether vitamin D, in combination with either existing drugs or teamed with novel, immune-modifying microparticles derived from clinical polymers, can serve as a countermeasure against the sharp, painful inflammation as well as delay injury caused by mustard gas.

“Identifying vitamin D-related compounds as potential therapies against tissue destruction caused by vesicants may well save lives in the event of mass exposure because these drugs are safe and widely available,” said Lu.
GENETICS: When identifying potential drug targets, location matters for tumors, too

Paul Tesar, PhD

Scientists have grown cancer cells in laboratory dishes for a long time, but laboratory dishes are not the human body, and cancer cells seem to know it. New research has found certain glioblastoma brain tumor cells use distinct growth strategies inside artificial environments. The genes involved are different than those needed to grow inside the body. The findings suggest studies using laboratory dishes alone could be missing potential drug targets.

In parallel experiments published recently in Nature, a team of researchers from Case Western Reserve University School of Medicine and Cleveland Clinic Lerner Research Institute implanted brain tumor cells into mice and grew the same cells in laboratory dishes. Led by senior author Paul Tesar, PhD, Dr. Donald and Ruth Weber Goodman Professor of Innovative Therapeutics and associate professor of genetics and genome sciences, the team simultaneously measured genes in both models, focusing on those necessary for cell survival.

The team found 57 genes required for tumor cells to grow in the brain—in vivo—but not inside laboratory dishes—in vitro. According to the researchers, the genes represent key tumor growth processes not previously identified.

Of the 57 genes, 12 were all related to a single process—how cells respond to stress. The researchers blocked several of these stress response genes in the implanted cells. The mice grew smaller brain tumors and lived longer. But blocking the same genes in cells grown in traditional laboratory dishes had no effect. It’s possible the genes could serve as drug targets to help shrink tumors inside human brains, too, say the researchers.

The parallel experiment model could be used to find drug targets for other cancers. Says Tesar, who is also a member of the Case Comprehensive Cancer Center, “Prior attempts at discovering therapeutic targets have generally been done in cell culture; that is, patient cells on plastic dishes in artificial media to help them grow. The hope is that systems like ours that more closely mimic the natural tumor environment will identify new targets that better translate into effective therapies for patients.”

BIOCHEMISTRY: Slicing and dicing genes to make sperm

Donny Licatalosi, PhD

Developing sperm are particularly adept at chopping genetic information. They can slice and dice their genetic messengers (RNA molecules) to make multiple proteins from a single gene—a process known as alternative splicing. Developing sperm cells utilize this mode of gene control more than any other cell in the body, allowing them to generate a complex pool of proteins from a smaller set of genes.

Scientists long ago noticed a pile up of spliced gene products inside developing sperm. Some thought these were a byproduct of other developmental processes. Their function wasn’t obvious, but it was clear that splicing defects can cause certain types of muscular dystrophy and Parkinson’s disease. Mechanisms behind alternative splicing have remained elusive.

Recently, researchers led by Donny Licatalosi, PhD, assistant professor in the Center for RNA Science and Therapeutics, found a single protein at the center of alternative splicing inside developing sperm cells. The protein controls how more than 200 genes are chopped and is critical in every developmental stage. Without it, developing sperm can’t communicate with neighboring cells in the reproductive tract. They also can’t transport materials between cells to grow properly.

Removing the protein also has consequences inside nearby Sertoli cells that serve as navigators for developing sperm. Sertoli cells couldn’t recognize or engage with developing sperm that lacked the key protein. The findings show alternative splicing is tightly controlled in developing sperm, and that it is needed for cellular crosstalk in the reproductive tract.

The study was recently published in Cell Reports. According to Licatalosi, it sheds light on why young sperm are so busy trimming genes. Snipping RNA may be one way cells communicate, and we are just beginning to understand their language.
CANCER: CWRU’s moonshot project targets cancer patients who smoke

Quitting smoking is one of the most difficult things a person can do. Taking on the challenge in the throes of chemotherapy or radiation after a devastating cancer diagnosis seems impossibly daunting. But through the help of TIPS, a new School of Medicine program, that’s exactly what Cleveland-area patients are doing.

“They are in survivor mode,” said the program’s head, Monica Webb Hooper, PhD, professor of oncology, family medicine and community health, and psychological sciences at the School of Medicine and director of the Office of Cancer Disparities Research at the Case Comprehensive Cancer Center. “Conventional wisdom says that patients would be so overwhelmed with their cancer diagnosis and its ramifications that even asking them to consider quitting smoking simply isn’t feasible. But once patients understand how persistent smoking affects their treatment, they are motivated to become tobacco-free.” A large majority of patients referred to the program by their physicians have agreed to take part.

Tobacco Intervention and Psychosocial Support — TIPS — is an eight-to-twelve-week program serving patients at University Hospitals Seidman Cancer Center, MetroHealth’s Cancer Care Center, and Cleveland Clinic Cancer Center. TIPS was launched this past April following the Cancer Moonshot Blue Ribbon Panel’s recommendation to target tobacco cessation in medical oncology. Funded by CVS Health, it is one of eight such cessation projects in the country that received the foundation’s support.

TIPS has several evidence-based features for meeting the needs of patients. These include nicotine replacement therapy (patches and gum), motivational strategies for quitting, cognitive behavioral therapy, cancer education, and stress management — all culturally targeted when appropriate and available in individual and group format. Cognitive behavioral therapy, which emphasizes the influence of thoughts and feelings on behavior, is used to address a variety of problems. When applied to smoking cessation, it includes mental and behavioral coping-skills-training to manage the urge to smoke and relapse-prevention strategies. It differs from (and can complement) educational approaches that emphasize the health effects of smoking. Patients can take part in TIPS via phone or virtual visits if they’re at a satellite site or too ill to come for in-person assistance.

“We emphasize to patients that quitting smoking will increase the efficacy of their treatments,” said Webb Hooper. In addition to targeting current smokers with thoracic and gynecologic cancers, TIPS serves smokers with those diagnoses who quit in the past year because of the high relapse rate. In its first three months of operation, dozens of patients have taken part with three-quarters hitting their target quit dates. Continuing follow-up and support are being provided. The program will be expanding to include patients with other types of cancer in the future.

In addition to TIPS, Webb Hooper is directing the END (End Nicotine Dependence) Clinic, an exploratory study that will examine the feasibility and potential success of cognitive based therapy for tobacco cessation delivered in multiple formats. It is aimed at all adult tobacco users, not just those with a cancer diagnosis. “There is a real need for a program like this because Cleveland has a rate of smoking that is double the national average (35 percent versus 17 percent),” she said. “The goal is to reduce barriers to participation in tobacco cessation programs, and understand stress, family, and other contextual factors that affect long-term success.” Participants will have a choice of cognitive based therapy for tobacco cessation delivered in-person (individual or group), via telephone counseling, or through video-counseling. They will also be offered up to eight weeks of nicotine replacement therapy and text messaging-based support. The findings will be used to inform the development of a larger study.

Cleveland’s smoking rate is double the national average (35 percent versus 17 percent).
In 1810, the first physician came to Cleveland to minister to the needs of the area’s 57 inhabitants. He ran a local store to supplement his income.

By the late 1850s, there were dozens of physicians and surgeons, the Erie and Ohio Canals had connected the now-incorporated city to other major areas, and railroads were criss-crossing the state. In just 50 years, a small, isolated farming town established with less than 100 people had become home to more than 40,000. In 1860, Cleveland was the 21st largest city in the nation.

And amidst all of this growth, somewhere between the canals and the railroads, there was talk of a medical school.

In truth, there was a school to the east of Cleveland, but it was mired in financial difficulties and four of its six professors resigned. Together, they approached Western Reserve College in Hudson and asked to establish a medical department. The first classes began in the fall of 1843.

This is how our story begins. A quiet Cleveland persistence, a desire for something better. We are proud of what we have accomplished in that rich and storied 175-year history. But even more than the accomplishments themselves, we cherish the resiliency and purpose that cradles those innovations. We dream of a better way and those dreams encourage us to confront the expectations and boundaries of medical education and research.

Because at the School of Medicine, the dream is only the beginning.
The Medical Department of Western Reserve College is founded in Cleveland, Ohio after former faculty from nearby Willoughby University asked the WRC trustees to create a new medical department. John Delameter, MD, is the first dean.

Beginning with Nancy Talbot Clarke, MD, [1852] (pictured) and Emily Blackwell, MD [1854], the Medical Department has now graduated six of the first seven women to earn a medical degree from a recognized medical school in the U.S.

Abraham Flexner conducts a now-famous survey of all medical schools in the U.S. and Canada on behalf of the Carnegie Foundation for the Advancement of Teaching, concluding that the medical school at Western Reserve was second only to that of Johns Hopkins: “Of the future of Western Reserve there is no doubt… it is already one of the substantial schools in the country.”

The School redefines American medical education again with the innovative Western Reserve curriculum, an extension of the 1952 principles, including a focus on problem solving; self-directed learning; integrated basic and clinical sciences; and interdisciplinary teaching.

The School moves into new facilities in University Circle. At the time, the new building was the largest structure occupied by any medical school in the U.S.

The School’s Center for Adolescent Health announces the formation of the country’s first adolescent health concentration in a Master of Public Health degree program.

The School of Medicine breaks ground for a new science wing in the Harland G. Wood Building, which was built in 1924. The new eight-story glass and steel addition is part of a $21 million project.

Microsoft partners with Case Western Reserve University and Cleveland Clinic to develop medical and engineering platforms for the newly produced HoloLens virtual reality technology.

Physician Assistant Program begins its inaugural class.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1860</td>
<td>Medical Department graduation requirements include three years of study, a thesis, testimonials of good moral character and an oral examination. Those with a Bachelor of Arts degree could graduate after two years, while those who had been in medical practice for at least four years could graduate after a year.</td>
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<tr>
<td>1865</td>
<td>Charles B. Purvis, MD, the third African American to earn a medical degree from a recognized American medical school, graduates from the Medical Department.</td>
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<tr>
<td>1887</td>
<td>The second Medical Department building is considered to be one of the best medical buildings in the country.</td>
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<tr>
<td>1952</td>
<td>Introduction of the “new curriculum,” a revolutionary change in medical education that became the international standard within a decade. The basic tenets focused on organ systems, integrated basic and clinical sciences, introduced students to patients and clinical work in the first year, and created a collegial educational environment for both faculty and students. These principles continue to be applied in the school’s Western Reserve2 curriculum today. (Pictured left to right: Thomas Hale Ham, MD; Joseph T. Wearn, MD; John L. Caughey, Jr., MD)</td>
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<tr>
<td>1956</td>
<td>CWRU offers the first dual MD/PhD program in the country, which becomes a model for similar programs.</td>
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<td>1989</td>
<td>The International Child Health track is the first known dedicated program in pediatric residency training.</td>
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<tr>
<td>2006</td>
<td>The School of Medicine launches Western Reserve2, the latest major evolution in the curriculum, interweaving four themes: research and scholarship; clinical mastery; teamwork and leadership; and civic professionalism and health advocacy to prepare students to learn in a rapidly changing health care environment.</td>
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<td>2006</td>
<td>The School of Medicine partners with the Cleveland Municipal School District to create the School of Science and Medicine at John Hay High School, the first such school in the nation.</td>
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<tr>
<td>2007</td>
<td>The School of Medicine and the CWRU School of Dental Medicine join forces to offer the first DMD/MD dual-degree program in the country for students studying general dentistry.</td>
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<tr>
<td>2007</td>
<td>Pamela B. Davis, MD, PhD, is appointed Case Western Reserve University’s first woman dean of the medical school.</td>
</tr>
<tr>
<td>2019</td>
<td>The new four-story, 485,000-square-foot Health Education Campus opens. This state-of-the-art collaboration between CWRU and Cleveland Clinic houses the Frances Payne Bolton School of Nursing, the School of Dental Medicine and the School of Medicine, including its Cleveland Clinic Lerner College of Medicine track in an effort to promote interprofessional education that prepares students for real-world patient care.</td>
</tr>
</tbody>
</table>
The discoveries

1896
The first full x-ray of the human body is taken by Dayton C. Miller, PhD.

1915
First simulated milk formula for infants developed by alumnus and pediatrics professor Henry Gerstenberger, MD.

1925
Otto Glasser, PhD, develops the condense dosimeter to measure x-rays and radiation. These were sold by the Victoreen Instrument Co. and became the industry standard, including use by the U.S. government to test atomic bombs.

1926
Benjamin S. Kline, MD, develops the Kline test, a rapid precipitation test for diagnosing syphilis.

1950
Henry A. Zimmerman, MD, is the first to catheterize the left side of the human heart.

1953
Frederick Cross, MD, and his partner, Earle Kay, MD, develop the first heart-lung machine for use during open-heart surgery.

1954
F. Mason Sones, Jr., MD, the “father” of coronary angiography, introduces cardiac catheterization in neonatal patients. In 1958, he completes the first selective coronary arteriogram and, later, is the first to combine cardiac catheterization, angiography, and high speed x-ray motion picture photography as a single procedure.

1957
First synthesis of angiotensin by F. Merlin Bumpus, PhD.

1950
George Phalen, MD, identifies carpal tunnel syndrome and creates the first diagnostic test, still in use today.

1954
F. Mason Sones, Jr., MD, the “father” of coronary angiography, introduces cardiac catheterization in neonatal patients. In 1958, he completes the first selective coronary arteriogram and, later, is the first to combine cardiac catheterization, angiography, and high speed x-ray motion picture photography as a single procedure.

1950
Henry A. Zimmerman, MD, is the first to catheterize the left side of the human heart.

2006
The first link between oral bacteria and preterm birth is found in humans by researchers from the School of Medicine and School of Dental Medicine.

2008
Sanford Markowitz, MD, PhD, develops the first stool DNA tests for early detection of colon cancer. In 2016, Markowitz and his team go on to discover a new gene mutation unique to colon cancers in African Americans.

2013
Mark Griswold, PhD, develops Magnetic Resonance Fingerprinting, a new MRI technology that can identify specific diseases and tissues.
1906
First modern blood transfusion using a canula to join blood vessels performed by surgeon and faculty member George Crile, MD, who later helped found Cleveland Clinic.

1909
Faculty member, alumnus and prominent pediatric surgeon Samuel Kelley, MD, drafts The Surgical Diseases of Children, the first such treatise by an American surgeon.

1911
Roger Perkins, MD, convinced Cleveland city officials to chlorinate the city’s water in an attempt to eliminate enteric diseases like typhoid and, later, developed a method of filtering the water supply. By 1925, these improvements were fully in place and these diseases had virtually disappeared in the city.

1934
Harry Goldblatt, MD, develops the first animal model of hypertension and “Goldblatt clamps” to discover the cause of essential hypertension: constriction of the renal artery which reduces blood supply to the kidneys.

1935
First surgical treatment of coronary artery disease by Claude Beck, MD, the nation’s first professor of cardiovascular surgery. He later performed the first successful defibrillation of the human heart (1947), taught the first course in CPR (1950), and performed the first successful reversal of an otherwise fatal heart attack (1955).

1939
Faculty member, alumnus and prominent pediatric surgeon Samuel Kelley, MD, drafts The Surgical Diseases of Children, the first such treatise by an American surgeon.

1969
Jay Ankeney, MD, and Claude Beck, MD, perform the first successful off-pump open-heart surgery.

1982
Fritz Rottman, PhD; Rick Woychik, PhD; and Edward Goodwin, PhD, discover Bovine Growth Hormone polyadenylation signal (BGH PolyA). Later, the signal is licensed to develop a widely-used treatment for non-Hodgkin’s Lymphoma.

1997
Creation of the first artificial human chromosome by a team from the department of genetics led by Huntington Willard, PhD.

2008
Bioethicist Insoo Hyun, PhD, leads the International Society for Stem Cell Research international task force of experts from 13 countries in developing new guidelines for the responsible development of safe and effective stem cell therapies for patients.

2014
Brian Grimberg, PhD, develops the first malaria rapid-detection device that can effectively diagnose the disease in malaria-endemic regions. The device earns a Patent For Humanity Award from the Commerce Department’s U.S. Patent and Trademark Office in 2016.

2015
Jackson T. Wright, Jr., MD, PhD, is principal investigator for CWRU during the NIH’s Systolic Blood Pressure Intervention Trial (SPRINT), one of only five clinical center networks in the country to participate. The study upends current guidelines for treating high blood pressure by recommending that systolic blood pressure goals should be below 120, 20 mmHg below the current standard of 140.
To find a cure for cystic fibrosis, collaboration is key

by Scott Harris

Robert Stern, MD, is barely visible behind his desk. He’s not a tall man, but that’s not the problem. Piles of books, newspapers, overstuffed folders and scientific journal clippings blanket the desktop and most of the office’s other flat surfaces. In a lone pencil holder, soda can tabs wind their way up the length of a pencil.

As cluttered as his desk is, it only takes Stern, professor of pediatrics at Case Western Reserve University School of Medicine and a pediatric pulmonologist at University Hospitals Rainbow Babies and Children’s Hospital, a few seconds to find the note.

The key passage of the letter, written a couple of years ago by a 33-year-old woman named Haley Cole, recalls the time when a simple phone call — from Stern — prompted her to pack a bag and board a plane.

“When I was living in Australia and you called to tell me I needed to come back to the U.S. for a drug study, I never hesitated,” Cole wrote to Stern. “I trusted you implicitly. And in those first few days of taking the study drug and realizing something profound was happening inside my body — realizing I did not have the placebo — is a feeling that will stay with me the rest of my life. Because it was that moment I saw life ahead of me that looked like something I could never have anticipated.”

Cole has cystic fibrosis, or CF, a disease first described in 1938 and remains one of the deadliest and most insidious of the world’s uncured diseases. Stern, her physician since she was four years old, is among a group of physicians and scientists based at Case Western Reserve University School of Medicine that has made CF their collective life’s work. Together, they’ve
When I was in medical school, I had a one-sentence education on cystic fibrosis: It’s a genetic disease and patients are dead by three,” says Stern. “But when I arrived in Cleveland, there were all these CF patients, and they were living beyond three years of age. Something was happening here. Something was changing.”

As recently as the late 1950s, after penicillin and vaccines for polio and influenza had been introduced, death still came for CF patients while they were still toddlers. There was no magic pill for cystic fibrosis and there’s still no cure today. And yet, today, the average life expectancy is 37 years old. Extending the lifespan for CF patients began with a pediatrician named LeRoy Matthews, MD, a professor at Case Western Reserve University School of Medicine and chair of the department of pediatrics at Rainbow Babies and Children’s Hospital. He decided to attack CF the hard way.

Matthews spent the late 1950s traveling the world to track down anything that seemed to work against CF. Matthews brought chest pounding, or percussion, to the United States after discovering it in the United Kingdom. He pushed inhalers into widespread use. He sought to aggressively treat infections.

Matthews’ approach was not without controversy. Mist tents were a clear net of plastic sheeting draped over a bed, roughly akin to a camping trip where the weather occurs inside. Children spent the night in the mist to loosen mucus. Although initial research findings were positive, others cast doubt on the tents’ effectiveness, and they were ultimately abandoned.

In 1964, Matthews and several colleagues published “A therapeutic regimen for patients with cystic fibrosis,” a comprehensive paper containing their full protocols and results, based on several doctors’, including Stern’s, clinical observations. Almost immediately, it became the linchpin of CF treatment around the country.

The proof was in the lifespan. As other centers struggled to keep the youngest children alive, average life expectancy at the hospitals affiliated with Case Western Reserve rose to 10. Then it kept rising. Patients started reaching uncharted milestones: first communion, high school graduation, first day at a new job. Families began traveling to Cleveland from all over the United States, Canada, Europe and South America.

“The prevailing opinion was that these kids were going to die anyway,” Davis recalls, “so we shouldn’t bother them very much. We shouldn’t be aggressive with their care. But there were a few places — the National Institutes of Health (NIH) was one of them and Cleveland was another — where they decided they were going to be very aggressive and take care of absolutely every symptom. The results were remarkable in terms of survival.”

It looks more like a piece of equipment to mix bread dough than modify your DNA. Nevertheless, sitting on a counter, a little ways from a box of disposable gloves, the polymerase chain reaction thermal cycler is helping scientists hack into genes using the groundbreaking and controversial CRISPR-Cas9 method, which can literally edit specific traits or mutations into and out of genes. High-tech equipment like this—high-powered image scanners, robots for fast-paced chemical testing, and a host of others — rubs elbows in the laboratory of Mitchell Drumm, PhD, professor of pediatrics and genetics at Case Western Reserve, with the
same familiar—high-school test tubes and eyewash stations. He also directs basic research for the Bernbaum Cystic Fibrosis Center and serves as vice chair for research in the pediatrics department.

Given that CF is a genetic disease, genetics is a big area of exploration in cutting-edge CF research. But if you think Drumm and his team are using tools like CRISPR to reach into the CF gene and correct the mutation, not so fast.

“So far we’ve been using it the other way around,” Drumm said. “We’ve been using it to create the mutations in tissue cultures so we can have matched sets of genes where the only thing different is the CF gene, so we can see what that gene causes to happen.”

It points to a theme in Drumm’s research, perhaps in Drumm himself: With his wire-frame glasses, stocky build and Buckeye State accent, he always seems ready to surprise you.

After all, this researcher was a member of the team that discovered the gene that causes CF.

That was 1989, while he was a genetics student at the University of Michigan. He did it after developing a powerful new technique called “chromosome jumping,” alongside his friend and mentor Francis Collins, MD, PhD, who famously went on to map the entire human genome and now heads the NIH.

But something else befell Drumm around that time that shaped his future as much as the technical breakthrough. One day, his parents sent word about a neighbor from Ohio who had given birth. The baby boy had a condition called cystic fibrosis.

“I really didn’t know anything about the disease at the time,” Drumm recalls. “So I went to Francis and said ‘we got the [chromosome jumping] system working, now we have to apply it to something. Can I try it on CF?’ He said ‘sure, why not?”

Drumm demurs on the idea that he did anything special. He believes that science is a shared experience, and rejects the notion of individual glory. To get a glimpse of Drumm’s inner motivation for the work he does, ask him about the CF patients he’s met over the years.

“I think you only have to meet one patient to understand,” Drumm says.

He pauses. When he starts to talk again, despite the hundreds if not thousands of times he must have had this discussion, his voice shakes.

“I have three daughters myself, all healthy, but it makes you realize,” he says. “For a mom and dad, it’s a 24-hour job.”

He and his team are deploying the CF gene not only as something to be manipulated but as a target for potential new therapies. In a process called high-throughput screening, researchers create CF cells and then fire thousands of different chemicals at them to evaluate what changes occur.

The notion of repurposing drugs is a relatively new frontier. Case Western Reserve scored a resounding victory on this front in 1995, with a drug not much different from aspirin. Michael Konstan, MD, professor and vice dean for translational research, who previously chaired the pediatrics departments at both the School of Medicine and Rainbow Babies and Children’s Hospital, led the trial developed with Davis, that demonstrated that common, over-the-counter ibuprofen, taken in high doses twice daily, every day, was an effective therapy for treating the lung disease in young patients with CF.

Konstan is intense as he talks about the disease. There is a chill in his voice that hardens to ice when he talks about CF.

“For [CF patients] it’s like breathing through a straw,” Konstan says. “Even a child who appears healthy and participates in sports and school activities might be spending several hours a day taking many therapies to maintain their health. It’s a huge treatment burden.”

Konstan has cared for hundreds of CF patients while simultaneously leading clinical trials, not only in the U.S., but worldwide.

In addition to repurposing ibuprofen for CF, Konstan also played lead roles in testing new drugs for use with CF. Ivacaftor, approved by the U.S. Food and Drug Administration in 2012, was the first to attack the cause of CF rather than just symptoms. The drug, which came to be known by the brand name Kalydeco, was shown to first work in one CF mutation, affecting about 1200 patients in the U.S. — there are about 2,000 different mutations that cause the disease — and has subsequently been expanded for use by other patients with responsive mutations. For some patients, Kalydeco essentially halts disease progression, as it has in Haley Cole.

Recently, an analysis of the national and international contributions to drug discovery by the prestigious medical journal Cell, selected the development of Kalydeco as a major advance in therapeutics. This analysis identified Case Western Reserve as the leading contributor to this drug coming forward to patients, and underscores the importance of collaboration between clinicians and basic scientists to the systematic development of cures. “Something we have at this university that’s a bit unique is that our clinicians, the doctors like myself who take care of patients, and our basic scientists, who make the discoveries in the lab, work very closely together,” Konstan says. “By us working together, we really help each other understand the entire process of what it takes to bring new therapies to patients.”
Davis has helped to guide the CF team and scores of others, but she also leads by example.

There are quite a few success stories on her résumé, but one of the more eye-catching centers around a problem that has long plagued CF researchers: How to deliver genetic material directly to the cells affected by CF, which reside deep in the notoriously sensitive lungs.

Years ago, scientists devised a plan to bring in the genetic material on an unusual Trojan horse: viruses.

The average virus is about 300 nanometers wide. To put that in perspective, the average human hair is about 75,000 nanometers wide. Deactivated of their harmful properties, viruses, the theory went, were small enough to reach and enter the targeted cells—carrying with them the genetic material that could enter the nucleus and ultimately cause the cell to begin properly creating the CFTR protein.

The idea caused excitement across the scientific community and beyond. Could this concept finally be the key to delivering these genetic therapies?

As it turned out, viruses, even deactivated ones, were too disruptive for the job they were given in CF research, and the idea was tabled.

Luckily, Davis had another idea.

“At the time, viruses made a lot of headlines and news, and they were very sexy, but I didn’t like the viruses because they were immunogenic and I thought that if [the body] made antibodies against your vector, you were not going to be able to treat people very long,” Davis explains. “So I wanted something that was pretty safe, non-immunogenic, and would be pretty efficient.”

Davis ultimately learned that mixing strands of a positively charged protein with DNA, which is negatively charged, caused the DNA to compress into nanoparticles so small they only had about twice the volume of the atoms comprising the DNA molecules.

“That’s pretty compacted,” comments Davis.

Investigators, led by Konstan, introduced some 300 trillion copies of the compacted DNA into the nose of a few patients with CF, with encouraging results. That was 2004, and scientists recently completed a new vector for use in the lungs. A new trial is in the discussion phase that, if it occurs, would bring genetic material into the lungs, with the goal of delivering the genes directly into malfunctioning CF-affected cells.
and causing them to properly manufacture the CFTR protein and potentially alleviate or cure CF and its symptoms.

As impressive as the individual innovations are, it’s the remarkably efficient cycle of cooperation among doctors on both sides of the biomedical aisle that the CF team says makes it unique.

“I work at the bench and they see the patients,” Drumm says. “The clinicians come and say ‘hey these are the tools we need.’ We’re about 20 feet from each other. We have our meetings together. It’s the coffee pot effect. Some of the best conversations happen because you run into each other.”

It’s evident in patients like Cole, who, in 2009 at age 25, received the call from Stern suggesting she participate in a new drug trial at Case Western Reserve.

The drug was Kalydeco. The drug’s mechanism of action was based on Drumm’s genetic discoveries. The trial was led by Konstan. Stern made the introduction that brought Cole into the trial.

The result gave Cole a new lease on life. Now she’s Haley Stone, 33 years old and happily married. Her wedding was in Thailand.

“They take care of patients in a very dedicated fashion, and the patients would do anything for them,” Davis says of the CF physicians. “We have a large and very loyal patient population. The doctors form long-term relationships with patients, and those patients participate in research and come back here regularly.”

“We all have to work together, because this disease is bigger than all of us,” Davis continues. “And we may have our squabbles, but the real fight is with the disease. People like me give leadership opportunities to other people. Faculty have to be given an opportunity to grow, or they might leave and this highly productive ecosystem gets ruined. So you have to step aside and let other people have their shot.”

There’s only one ingredient larger than that: a shared drive toward a cure.

“We joke with each other that we can’t wait until the day that we can retire, and we can do that only after we know that newborns will no longer have this disease, or that we can control it to the point that they will lead an entirely normal life,” says Konstan. “We know that a cure for CF is in sight and that hard work pays off, for us, but especially for our patients.”

M
Denise and Sarada Fuzzell are outsiders in the Amish communities where they spend most of their days. But they’ve been knocking on doors here for so long, people have come to expect them. “I’ve heard about you,” the residents often say when they answer their doors. “I’ve been wondering when you would come.”

The visits that follow can last hours. The Fuzzells chat with their hosts about shared acquaintances, savor fresh-baked pie, and tour gardens. Sarada’s even been drawn into a game of Scrabble with a local spelling bee champion. (She lost.) But ultimately, the two women come to this part of Ohio — where communication
rarely involves a telephone, let alone a computer — as part of a massive, technology–driven research effort out of Case Western Reserve University School of Medicine.

They are members of an interdisciplinary team led by genetic epidemiologist Jonathan Haines, PhD, chair of the Department of Population and Quantitative Health Sciences and the Mary W. Sheldon, MD, Professor of Genomic Sciences, who has been working with the Amish to unravel some particularly vexing genetic puzzles for nearly 20 years. They are seeking families who are willing to share their clinical information and blood samples for DNA sequencing with the team.

The Fuzzells have found that the Amish almost always agree to participate. “They’re very community–oriented people,” Sarada says. “If they know that they may be carrying a trait that could lead to disease, they’re very interested in helping with the research to find a cure and maybe help their community down the road.”

It’s not hard to convince people of the potential impact of their contribution, especially when the team is seeking participants for studies about Alzheimer’s disease. With at least one of every three people who live past the age of 85 expected to develop the devastating neurodegenerative disease, any information that
brings researchers closer to an effective treatment or prevention strategy is of tremendous value.

Haines and his team are actively exploring the genetics behind several diseases, but since he arrived at the school in 2013 to direct Cleveland’s new Institute for Computational Biology (ICB), the Alzheimer’s disease component of his research program has become a major focus. Backed by a major initiative from the National Institutes of Health (NIH), researchers at the ICB and collaborators worldwide are investing heavily in obtaining and analyzing as much information as they can.

Haines thinks genome sequences from Amish families are a promising place to search for answers. The group’s shared ancestry, large families, and fastidious genealogical records make it easier for his team to sift through genetic sequences to identify variants that contribute to or protect against disease. He’s optimistic that his team will find clues about the biology of Alzheimer’s disease in the generations’ worth of data they now have from Amish families, and that their findings might suggest ways to intervene in the disease process. But the Alzheimer’s field needs as many leads as it can get.

Amyloid-beta was identified as the primary component of the brain plaques that are a defining feature of Alzheimer’s disease in 1984. Soon after, the protein tau was found to make up the tangled fibers that appear inside neurons in affected patients’ brains. Interfering with these plaques and tangles quickly became the focus of drug development efforts. Hundreds of clinical trials have tested potential therapies, but so far these have led only to a series of high profile failures. No new drug has been approved to treat Alzheimer’s disease since 2003. The five drugs that are approved for treatment of Alzheimer’s disease modulate neurotransmitter signaling, and can only help manage symptoms.

“There’s been a lot of work trying to use what we know to target these processes, and so far none of it has worked,” Haines says.

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Researchers need new strategies for developing treatments that either prevent Alzheimer’s disease or halt its progression, he says.

It’s already becoming clear that the pathology of Alzheimer’s disease involves more than just plaques and tangles, suggesting there may be better ways to intervene. There are hints that energy metabolism and inflammation contribute to the potentially decades-long process that destroys brain circuits. As researchers broaden their search, they may implicate still more players. If geneticists can identify factors that either protect against or increase the risk of Alzheimer’s, scientists will have a better idea of or about which genes and pathways are likely to be involved.

To enable a comprehensive search, the genome sequences that Haines and his team obtain from participants in their own Alzheimer’s studies are being pooled with thousands of others collected for Alzheimer’s studies across the United States and Europe. Members of two large genetics consortia, plus three genome sequencing and analysis centers, are collaborating through the Alzheimer’s Disease Sequencing Project to generate a trove of data that will be freely available to the research community, and which Haines and colleagues at the ICB have already begun mining for clues about the disease.

The project, supported by the National Institute on Aging and the National Human Genome Research Institute, is a resource-intensive effort, involving dozens of institutions and petabytes of data. Haines expects it to pay off. Thorough analysis of genomic data from tens of thousands, if not hundreds of thousands, of people may be what it takes to find solutions for this disease, he says.

The genetic factors that underlie Alzheimer’s disease are undoubtedly complex. Mutations in three different genes have been linked to early-onset Alzheimer’s disease, whose symptoms become apparent when affected individuals are in their thirties to mid-sixties. Just one gene, APOE, which Haines was instrumental in discovering, is known to clearly shape individuals’ risk of developing the late-onset form of the disease, which is far more common. But hundreds of genetic variants likely nudge a person’s risk in one direction or the other. Some of these may only be apparent when they are present in certain combinations, or when they are combined with environmental factors that remain almost entirely unknown. According to Haines, about 20 to 30 such variants have so far been linked to the late-onset disease. “We’ve got to try to find them all,” he says.

The nature of Alzheimer’s disease presents particular challenges to genetic studies. Patients suffering from dementia may not be able to give their consent to participate, and with most individuals diagnosed late in life, it’s usually impossible to involve older generations in family studies. Further muddying the issue is the fact that the disease is clinically diverse and its diagnosis is not always definitive.

Funders and participants in the Alzheimer’s Disease Sequencing Project are betting on the power of big data to make sense of all this. With vast improvements in both genomic and computational technologies over the past 20 years, it’s now feasible to obtain, store, and analyze complete genetic information for hundreds of thousands of individuals. “The technology has gotten to a point where we can really dig into this problem in a big way,” Haines says.

An initial discovery phase of the Alzheimer’s Disease Sequencing Project has already generated genome sequences for thousands of individuals with and without the disease. Now the NIH is investing $24 million to support the School of Medicine and seven other academic medical centers as their researchers analyze the data over the next four years. The Consortium for Alzheimer’s Sequence Analysis, a five-university group co-led by Haines, has $12.6 million in funding to identify rare genetic variants that either protect against Alzheimer’s disease or increase risk.

“There’s been a lot of work trying to use what we know to target these processes, and so far none of it has worked,” Haines says. Researchers need new strategies for developing treatments that either prevent Alzheimer’s disease or halt its progression.”

For an endeavor of this scale, the data management challenges begin long before any analysis. The Alzheimer’s Disease Sequencing Project involves collaborators at institutions across the United States and Europe who are investigating Alzheimer’s disease from various angles, each with a study designed to address their own specific questions. A handful of facilities carry out all the sequencing for the overall effort, but the data individual teams gather vary widely in both their content and formatting. The result is a vast collection of genome sequences and associated data that must be meticulously quality controlled and manipulated into a standardized form—meaning that after study participants’ blood samples are collected, it can be years before their genome sequences reach the people who will analyze them.
A few years into the project, processes are being streamlined and the first batch of data is in. More than 500 whole genome sequences and 11,000 complete exome sequences, which cover the protein-coding parts of the genome, have already been delivered to the ICB, with thousands more expected soon. Eventually, the Alzheimer’s Disease Sequencing Project expects to generate complete genome sequences—each made of up some three billion base pairs of information—for tens of thousands of individuals. The sheer volume of data filling the ICB’s servers is empowering. “I think there’s a lot in there that we’re going to be able to find,” Haines says. But the team knows that the technology is just a tool. Finding meaning in all those sequences is going to require shrewd minds and creative approaches.

The challenge is exactly the kind of problem the ICB was created to tackle. Case Western Reserve University School of Medicine, the Cleveland Clinic Foundation, and University Hospitals Cleveland Medical Center, formed the collaborative institute in 2013 to advance scientists’ ability to deepen the knowledge of biology and improve human health by taking advantage of the vast amounts of information their clinicians and researchers were already collecting. Researchers at the three institutions are working together through the ICB to share data and develop tools and infrastructure to manage and analyze it. Their work so far provides an important foundation for the analysis phase of the Alzheimer’s project. “We’ve figured out how to deal with a lot of these data, and the next two or three years are going to be a lot of fun,” Haines says.

If you ask someone at the ICB how many genomes they will need to find what they’re looking for, that person is likely to tell you they see no reason to stop collecting data until they have genome sequences from everyone—every person who has developed dementia and everyone who has maintained their mental sharpness as they aged. The more data the better, everyone agrees. But they know that sequencing genomes, while cheaper than it’s ever been, is still expensive—and more importantly, the need for Alzheimer’s interventions is too urgent to wait. So the team is intent on getting the most out of the data they have now.

William Bush, PhD, assistant professor in the Department of Population and Quantitative Health Sciences, says real solutions will likely come by tackling the problem in many different ways. The genetic data become much richer, he says, when they are combined with additional biological information. No one is yet churning out volumes of data on gene expression or epigenetic modifications to match the DNA sequence information being compiled by the Alzheimer’s consortium; but public databases and other resources are likely full of clues about the biology of the disease. Finding ways to glean the most out of available data can go a long way. “If you’re clever and you put the pieces together in the right way, then you can really explain some things,” Bush says.

One priority for Bush is mapping how the range of genetic variants in people with Alzheimer’s disease are likely to impact the three-dimensional forms of the proteins their cells produce. He is drawing on structural information from biochemical studies and computational modeling to find protein regions where Alzheimer’s-associated variants cluster. Finding sites that are commonly disrupted in affected individuals will help sort out which rare variants picked up in genome-wide analyses are relevant to the disease, he says. Pinpointing these sensitive sites also gives drug developers a head start in thinking about how to interfere with the activity of a protein’s ability to spur disease progression.

Considering the genetics in context and thinking deeply about the biology of the disease is critical, team members say. The sequences and clinical records that they deal with represent real people with complicated diagnoses, says Yeunjoo Song, PhD, a computational biologist who manages incoming data for the lab. Understanding the complexity of the disease and keeping up with what others in the field are learning helps the team ask the right questions of their data and prioritize certain findings for follow-up.

“People are really motivated to find an answer for this disease,” says Renee Laux, who coordinates the lab’s efforts to enroll study participants.
Indeed, identifying variants that associate with disease is just a beginning. Five years from now, Haines hopes not just to have identified many variants that contribute to Alzheimer’s disease, but also to have begun characterizing their functional effects. Across the street from the ICB’s computational hub, additional members of his team work in a traditional molecular biology laboratory. The lab, whose freezers are stacked with decades’ worth of DNA and blood from study participants, is equipped not just to efficiently process samples for sequence analysis, but also to investigate the functional consequences of the variants the team links to disease—paving the way toward the identification of drug targets.

It will take a wide range of expertise to get from DNA sequences to drug targets. Even though samples and sequences for the Alzheimer’s Disease Sequencing Project converge on the ICB from far-flung sources, Haines thinks his team’s deep knowledge of every step of the process, from study design and sample collection to functional analyses of variants, is a real asset. Team members don’t work in isolation, he says, but rather understand where their data comes from and what it needs to achieve.

That breadth of experience and close working relationship within the group also keeps the team focused on the potential impact of their work. Even as each individual focuses on their piece of the pipeline, they remain aware of the disease whose devastation they are working to curb. “People are really motivated to find an answer for this disease,” says Renee Laux, MS, research operations manager, who coordinates the lab’s efforts to enroll study participants. She’s speaking, with gratitude, about the individuals who volunteer their time and donate blood for her team’s research—but the same is clearly true of her colleagues.

Jonathan Haines, PhD
CULTIVATING compassion
Empathy for patients begins with teaching a better way to communicate

by Gay Eyerman

On a late July evening, there’s a buzz of excitement and anticipation in lecture hall E301. First-year medical students gather for their first block of courses at Case Western Reserve University School of Medicine. The professor, Kathy Cole-Kelly MS, MSW, breezes in and warmly greets the students with her trademark smile and high-energy stride. She begins by setting the stage for their first patient interview sessions — and the upcoming four years of their development as physicians.

“Let’s talk about relationship-building. This will be the first of about 150,000 medical interviews you’ll do in your career. The biggest difference you can make in your patient being heard and understood is your ability to get a good story.”

Cole-Kelly, a professor of family medicine, is affectionately known as “KCK” by her students. After a career in private practice in marital and family therapy, she became “consumed” by medical education in the 1980s. Cole-Kelly co-directs the foundational curriculum for first- and second-year medical students and created a four-year communication skills program. Students and faculty alike consider her the “heart and soul” of the humanistic core of medical education at Case Western Reserve.
Patients and families alike rank provider compassion among their greatest health care needs. In today’s challenging health care environment, physicians and medical schools are seeking new ways to provide competent and compassionate care. “Good communications skills are essential for conveying compassion,” says Cole-Kelly. “Patients know when you are empathic, and there are tools for helping that shine through.”

When she began teaching, the literature on communication skills in medicine was fairly limited. Over the years, she’s seen it “explode.” Cole-Kelly cites studies which show that compassion in medical care increases accuracy in diagnosis, leads to fewer malpractice suits, and contributes to greater satisfaction for both physician and patient. “People want to feel heard and understood,” says Cole-Kelly. “That happens through compassionate and skillful communication.”

In their early classroom sessions, first-year SOM students learn behaviors to enhance both the patient interview and the broader patient relationship-building process. These include:

- Connecting with small talk: “I like your Cavs jersey!”
- Recalling something personal about the patient that you learned at your past visit.
- Echoing what the patient has said so they know you understand.
- Asking open-ended questions that invite story-telling: “Can you say more about that?”
- Addressing everyone in the room and introducing yourself to family members.
- Making empathic statements such as: “That must have been very painful for you.”
- Establishing nonverbal communication with eye contact, leaning in, nodding, and if appropriate, holding hands.
- Using “guide posting” to tell the patient what you’ll be doing.
- Asking for the patient’s chief concern and then survey for other complaints.
- Asking for the patient’s input and ideas: “What do you think is causing this?”
- Summarizing what you’ve heard to show active listening.

As the new medical students break into small groups to begin the first of many practice sessions, Cole-Kelly leaves them with an affirmation and a challenge: “You’re going to have fun! Go and become the most humanistic, empathic, compassionate, and relationship-building physicians you can be.”

The Year 1 and Year 2 Foundations of Medicine and Health segment of the Western Reserve2 (WR2) Curriculum is a key vehicle for introducing students to attitudes and techniques which convey compassion to patients and family members. A foundational premise underlying this academic block is that good communication skills can be learned.

Every first-year medical student at Case Western Reserve begins with a five-week course called “Becoming a Doctor,” which helps students develop skills in compassion and empathy. Everyone takes part in exercises to help them understand life in someone
else’s shoes, including “poverty simulations” where students take on the role of living in poverty.

The course is led by Heidi Gullett, MD, MPH, assistant professor of general medical sciences family medicine, and community health, and a family and public health physician serving predominantly low-income patients at Cleveland’s Neighborhood Family Practice. Gullett also helps lead the Navigation Program where students partner with patients longitudinally to learn firsthand how the former are affected by poverty and other social conditions. Students not only learn to provide medical care but to become the “systems link” for patients across primary care, specialty care, social services, and case management.

Gullett assesses students on their ability to understand how multiple forces affect a patient’s health while communicating with compassion and empathy. “It’s been a beautiful experience. We help students become ‘systems thinkers,’ because they can be the nicest people and the smartest physicians in the world, but if they don’t understand how the health system is organized, they can’t help patients navigate as well as they need to,” says Gullett.

The Foundations of Clinical Medicine’s Tuesday Seminars, part of the Foundations of Medicine and Health block for first and second-year students are co-directed by Cole-Kelly and Ted Parran, MD, the Carter and Isabel Wong Professor of Medical Education, associate professor of general medical sciences, family medicine and community health. The pair teaches a broad range of clinical and professional capabilities by enhancing students’ sense of compassion in several dimensions. Seminar topics include the relationship between the physician and patients, families, and the community; professionalism; healthcare disparities; cultural competence; development of mindful practitioners; and end of life issues.

“The students often refer to this course as Touchy-Feely Tuesdays,” says Cole-Kelly with a smile. “When I first started, I bristled at this, feeling a little defensive. Now I embrace it.”

During students’ third-year clerkships, when they’re primarily on hospital floors, they return to the school on Fridays for more advanced problem-based learning called Case Inquiry (IQ) Plus. Cole-Kelly handles the first half-hour of those meetings, with students in small groups discussing challenges in their ability to show compassion. She also raises questions such as: Have I encountered cynicism in myself or others? What was my greatest moment of triumph?

In year four, the large majority of students choose to take a clinical-skills teaching elective where they have a variety of options. These include offering insights and comments on their first- and second-year colleagues’ interactions with mock patients in role-playing exercises.

“It’s vital that the clinical clerkships, which are intensive, are complemented with a continued emphasis on consciously cultivating compassion,” she says. M
MALIK DARWISH:
Malik Darwish is originally from the San Francisco Bay area. After completing undergraduate studies at UC Berkeley, he applied to medical schools around the country and chose CWRU for its emphasis on case-based, small-group learning. He has come to appreciate the way the school integrates workshops on communication skills into the training. "Students come in with different levels of emotional intelligence and how much they even care about relationship-building. But if you want to improve, you most definitely can," says Darwish. "The important thing I realized is that the skills they’re teaching us about how to interview patients, how to be an active listener, how to respond to empathic cues, are skills that can be learned and practiced."

KATRINA KRATZER:
Katrina Kratzer brings a different perspective to the curriculum. Raised in the Amish community of Walnut Creek, Ohio, she was trained as a nurse and still works part-time in the emergency department at Aultman Hospital in Canton, Ohio. While most girls in the Amish community don’t pursue higher education, Kratzer felt called to medical school. With years of experience as a nurse, she found herself surprised and pleased by the emphasis on communication skills at CWRU. "Some people think you naturally have empathy or you don’t. But I think it can be learned. The program helps us to be not only aware of our own feelings, but also to be culturally aware," says Kratzer. "The fact that CWRU set aside time to address this issue shows that they realize it’s very important. Medicine is so much more than being a smart doctor. Unless you can put yourself in your patients’ shoes and understand what they’re feeling, it’s hard to gain their trust. Those sessions helped me realize that to be a good doctor you have to understand empathy."

"Students come in with different levels of emotional intelligence and how much they even care about relationship-building. But if you want to improve, you most definitely can."

CRAFTING a better doctor
Fourth-year medical students at CWRU talk about their formation as empathic physicians with strong skills in communication and relationship-building.

"Some people think you naturally have empathy or you don’t. But I think it can be learned. The program helps us to be aware of our own feelings but also culturally aware."

Citing her part time work as a trauma nurse, Kratzer describes a moment where her classroom skills were tested in the ER. "Someone in an exam room was yelling ‘Why hasn’t my family been seen yet?’ The doctor asked, ‘Would you mind going in there?’ I walked into a situation where people were upset and angry. It was one of those things KCK taught us — just sit down on the patient’s level and open with an empathic statement. I said ‘I’m sorry, you look like you’re in abdominal pain, why don’t you tell me more about that?’ She started pouring out so many details and you could see it was so much more than her abdominal pain, but also frustrations about not being heard at her last medical visit. By the end, I was able to explain that we were in this together to figure out what was best for her. She ended up needing surgery. After I finished my shift and was walking to my car, I heard my name called and her family member ran up in tears and gave me a hug. He said, ‘Thank you for taking us seriously and for understanding what we were going through.’ That moment is what we’re being prepared for. This is how we can really make a difference."
MAGGIE KNISLEY:
Maggie Knisley leads student discussions after mock interviews with volunteer patients to help students critique each other’s skills and provide suggestions for improvement. “When I started, I thought medical education was learning the body systems, the diagnosis, the drugs,” she says. “But CWRU has added this patient-centered learning environment and more than ever I think it has to be incorporated into medical education. I’ve never in all my years of schooling been required to think about someone else’s perspective. It’s made me grow as a person. It’s made me more sensitive to how I behave and how other members of a medical team behave.”

“I’ve never in all my years of schooling been required to think about someone else’s perspective. It’s made me grow as a person. It’s made me more sensitive to how I behave and how other members of a medical team behave.”

ALEX SCHMIDT:
Alex Schmidt describes his upbringing as “pretty regular and middle class” in Kalamazoo, Michigan, but he attended a school system where 95 percent of the families lived below the poverty line. He was inspired to study medicine as a way to help underserved communities and was attracted by CWRU’s independent learner-centered curriculum and early clinical immersion. But when it came to the emphasis on communication skills, he was not fully convinced.

“I was a little argumentative about the premise,” he laughs. “I entered CWRU with the idea that at a highly regarded medical school, students would always be compassionate and considerate of their patients. But when I started doing patient care, I realized that even if you’re a compassionate and socially eloquent person, which I aspire to be most days if I’ve had coffee, it’s quite easy to get distracted by making a diagnosis or thinking about how to take care of a patient. It’s so easy to let the minor social skills slip and forget how to be a normal human being because you’re so wrapped up in your own workload or living in your own head. You can start thinking of a patient as your science project, so it becomes easy to miss an empathic cue.”

Schmidt began to see the value of communication skills that had become “second nature” during his third year. “The act of repeatedly interviewing patients with other people watching and critiquing every opportunity you have to show compassion — that was maddening! But you begin to build habits. And doing it with other students was the most important part. They’re starting from the same place you are, so it’s a very supportive environment where no one is chastising you. The repetition and real-time feedback was really helpful.”

“‘It’s so easy to let the minor social skills slip and forget how to be a normal human being because you’re so wrapped up in your own workload or living in your own head.’”
Imagine navigating modern American life without internet access. Like electricity and housing, it’s become a nearly fundamental need. Now it’s also a health care issue with the rise of electronic health records, patient portals, health data apps and more. But what about those who can’t afford 24/7 internet access or don’t have the skills to use tech tools? As this “digital divide” begins to affect health outcomes, thought leaders at Case Western Reserve University School of Medicine are creating strategies to mitigate the impact of the “digital divide” on health and health care.

Amy Sheon, PhD, MPH, adjunct associate professor of family medicine and community health and population and quantitative health sciences, came to Case Western Reserve University in 2011 as the first executive director of the new Urban Health Initiative with a mission to improve the health of local residents by building partnerships and leveraging the resources of the Clinical and Translational Science Collaborative of Cleveland.

It didn’t take long for Sheon to discover a “missing link” at the school. “Many people at CWRU are focused on underserved populations, but not on technology,” she observes. “Others are developing innovative uses of technology, but not considering social disparities. That’s the crucial niche I’ve been focusing on.”

Sheon began collaborating with others to address connections between technology and social disparities in health care. Adam Perzynski, PhD, is an assistant professor of medicine in the Center for Health Care Research and Policy and also director of the CWRU Patient-Centered Media Lab at The MetroHealth System. He and Sheon have become leading voices in educating and advocating around the issue of digital literacy and access. Both are founding board members of Connect Your Community, a nonprofit resource for digital skills training and advocacy for internet access in Cleveland, where at least one-third of adult residents don’t have high-speed internet or mobile connections at home.

Health care consumers are witnessing a boom in tech options including apps that track blood pressure, weight, glucose levels, disease symptoms and other biometric data that can be shared with health care providers. For patients with chronic conditions such as hypertension or diabetes, this is especially valuable. But not all consumers are able to use the new technology. “People see that everyone and their mother have smart phones, so they assume the digital divide is ending,” says Sheon. “But not having home high-speed internet or a mobile plan with ample data is a huge barrier, and newer adopters of technology very likely need instruction to use health apps. Also, chronic diseases such as type 2 diabetes are most prevalent in the very populations that lack of internet access is a major barrier to using tools like patient portals, with the health care digital divide most severe among vulnerable populations, including children and the elderly. “With all the cool, advanced technology we’re using to battle disease and make people healthy, every now and then we do things that make it worse from an equity standpoint,” says Perzynski. “Our current projects are embedding skilled digital training personnel in primary care clinics. It’s been wonderful to witness patients learning to use email or a mouse. You show them how to log into the patient portal and they open it and say ‘Oh my, this is all my blood pressure readings, my test results, and my prescriptions!’ It’s so empowering to be able to control and manage your own health.”

As leaders in research and solutions in health care disparities, Sheon and Perzynski are developing tactics that health systems can use to bridge the digital divide. Suggestions include:

- **Be aware.** Providers need to understand that if patients don’t have internet access or don’t know how to use digital tools, it can affect treatment and disease outcomes.
- **Ask patients.** Sheon proposes universal screening for internet access and the ability to use websites, portals or apps that provide patient health data or education.
- **Make connections.** Have patients call agencies such as United Way for referral to community organizations that teach tech skills, from libraries to groups like Connect Your Community that also screen for low-cost internet eligibility.
- **Train patients.** Perzynski’s group works with Cleveland’s Ashbury Senior Computer Community Center to train patients on using electronic health record portals. Sheon trains community health workers to help patients connect to the internet and use digital health tools.

Sheon has embraced a leadership role at Case Western Reserve in addressing this growing issue of the digital divide. She sees it as part of a unifying theme in her career: a passion to identify emerging issues in public health and serve disadvantaged populations. She also recognizes that this issue dovetails perfectly with the School of Medicine’s strategic plan to build strong ties to the community and improve local health. “Digital literacy and connectivity have slipped in under the radar as new social determinants of health. It’s hard to climb out of poverty when you don’t have the internet or know how to use it,” says Sheon.

Perzynski also sees Case Western Reserve as the right institution to tackle disparities in health care. “Our research is really exciting. It’s facilitated by this multidisciplinary setting at CWRU, with people’s willingness to walk across the hall or across campus or across town and have a conversation with a colleague in cardiology, sociology, statistics or internal medicine. Robust collaborations enable this type of research to promote people’s health. CWRU is a hub for this.”

**M**
School of Medicine offers new online certificate in nutrition

As more people opt for fresher, healthier foods to ward off disease and boost overall well-being, the need for accurate, trustworthy dietary information and guidance has never been greater. This is where Hope Barkoukis, PhD, and Case Western Reserve University School of Medicine’s new certificate in nutrition for health care professionals come in.

Barkoukis, a dietitian and interim chair of the Department of Nutrition, has spearheaded the debut of the online program which provides advanced training in nutrition for physicians, nurses, physician assistants, nurse practitioners, and other licensed health professionals. “The World Health Organization says almost three-fourths of chronic diseases could be reduced by lifestyle changes, including better nutrition,” says Barkoukis. “And nutrition is a recognized factor in three of the top four causes of death in the United States — cardiovascular disease, cancer, and cerebrovascular disease. As a school of medicine, we want to help people achieve optimum health by making better food choices in their daily lives.”

The 15-credit, five-course certificate program launched this summer with its first online offering: Nutrition for Community and Health Care Professionals, a required course that focuses on understanding how diet and nutrition affect health and wellness throughout the life cycle. Twenty students from a range of health care fields took part. A second required course, Advanced Human Nutrition, which will emphasize reading original research literature on nutrition topics, will be online by spring of next year.

Students will have many choices for their three electives, including:

- Pediatric Nutrition
- Dietary Supplements
- Physiological, Psychological, and Environmental Determinants of Food Behavior
- Nutrition for the Aging and Aged
- Diabetes Prevention and Management
- Sports Nutrition

“For today’s health care professionals, nutrition knowledge is no longer optional,” says Barkoukis. “People are living longer, managing disease through lifestyle change is of increasing importance, and there is strong cultural emphasis on staying healthy and independent. But there are many nutrition fads and false information that make it risky for people to take matters into their own hands. All of this means that health care professionals are ideally suited to help individuals achieve their nutrition goals.”

The courses are hybrid, comprising online videos and a faculty member from the Department of Nutrition who is available for questions. (Onsite healthy-cooking seminars and similar “live” features are coming as well.) In addition to the formal certificate program, students will have the chance to take individual courses (“a la carte”) in topic areas that interest them. Barkoukis says that the School of Medicine will be undertaking a campaign to make area health care professionals aware of the program. The campaign will take the form of brochures, direct mail, exhibit booths, virtual information sessions, and advertising on health care professional organizations’ websites. “We believe that the quality of the instructors, the content of the videos, and the eclectic mix of students will help establish this program as a model that others will emulate,” says Barkoukis.

A new certificate program at the School of Medicine allows health care providers to gain advanced training in nutrition.
The noble path

For a medical school with a reputation for accepting students possessing unconventional backgrounds, Noble Jones just might hold a record.

The fourth-year, Cleveland Clinic Lerner College of Medicine of Case Western Reserve University student has an MS in systems engineering from Johns Hopkins University and was a mechanical engineer for 15 years for NASA, working on various projects that explored deep space, the sun, the moon, the earth, and the harsh effects of space travel on the human body. The former Purdue University football player also played semi-pro and arena football after college, and volunteers as a coach in little league, middle school and high school football. And he also recently earned a U.S. patent for a novel surgical device.

What motivated an accomplished professional at the peak of his career to return to college to complete pre-med courses in the hope of attending medical school? “I love engineering and NASA,” says Jones. “I felt as if I were contributing to important scientific discovery through the U.S. space program. But I wanted to do something that connects with people on a one-on-one basis and perhaps help improve their lives.”

The inspiration for channeling that desire into a personal action plan came while watching a 60 Minutes segment on the Wounded Warrior Project, which provides free programs and services to injured military personnel. “The engineering side of me wants to solve problems. In the piece, I saw doctors and engineers developing artificial limbs for patients. That’s when it struck me that this was the route that I wanted to take.”

After taking courses for three years during the evening at the University of Maryland, Jones applied to and was accepted into the Lerner College. “There is real opportunity for innovation here,” he says. The first chance came in talking with Matthew Kroh, MD, now chief of the Digestive Disease Institute at Cleveland Clinic Abu Dhabi. “He allowed me to shadow him in the operating room,” says Jones. “I asked how my engineering background could help patients with digestive health problems. He encouraged me to look at endoscopy tools, which allow physicians to explore a patient’s esophagus, stomach and intestines through the mouth or rectum. We decided that my focus should be non-invasive repairs of gastrointestinal perforations, which arise from such causes as diverticulitis, appendicitis, peptic ulcers, steroids and trauma.”

The result: Jones was awarded a U.S. patent for a GI-tract perforation-closure device that attaches to an endoscope—or in layman’s terms, an internal stapler. Jones and colleagues are now testing various designs. The goal is to ensure that the tool can staple through different kinds of tissue and that the staples remain intact through normal, everyday events such as heavy coughing, which exerts significant pressure on gastric walls. He’s testing both permanent and dissolvable staples.

At the same time, Jones is deciding which medical specialty he will choose. He loves pediatric surgery: “Helping solve kids’ health problems can give them a fair shake at life.” He also is interested in physical medicine and rehabilitation, including prosthetics. “That, of course, sparked my interest in becoming a physician,” he notes. “After my mother had a stroke, I went with her for her rehab. I saw first-hand the good being done, which is a keen motivator.”

Whichever path he takes, Jones is committed to deploying his engineering skills to improve patients’ lives. He has an additional goal: “If I’m fortunate enough to commercialize any of my ideas, I intend to support terrific programs such as Pan-African Academy of Christian Surgeons, which is a non-denominational service organization that trains African physicians to become surgeons and remain on the continent, meeting an urgent need. I went on a surgical mission trip to Bongolo Hospital in Gabon in West Africa and saw the wonderful work they are doing and want to be a part of it.”

“I felt as if I were contributing to important scientific discovery through the U.S. space program. But I wanted to do something that connects with people on a one-on-one basis and perhaps help improve their lives.”
Students take on diabetes in Cleveland’s Hispanic community

According to the U.S. Centers for Disease Control, 40 percent of U.S. adults will develop type 2 diabetes over their lifetimes. For Hispanic men and women, the number is even higher — more than 50 percent. Hispanics are also about 50 percent more likely to die from diabetes than non-Hispanic whites.

“We want our presence here in Cleveland to make a difference,” says Frank May, speaking on behalf of classmates Paola Barrios Martinez and Daniel Moussa, all second-year medical students at the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University. He is explaining the impetus behind the trio’s plans to tackle a major health problem in the Hispanic community: diabetes. Barrios is from Mexico City, and May and Moussa both have Hispanic mothers, so all three students have an emotional connection to Cleveland’s Hispanic community. They are in the process of developing a diabetes-intervention program to benefit Lutheran Hospital in Cleveland’s Ohio City neighborhood.

The idea for the project began last year when Kathleen Franco, MD, associate dean of admissions and student affairs at the Lerner College, invited the three students to a fundraiser on Cleveland’s west side. Community leaders at the event were there to hear the health care vision of Leonor Osorio, DO, a fluent Spanish-speaking internist at Lutheran Hospital.

Osorio described an abundance of Hispanic patients with unmet health care needs — including a high incidence of diabetes — and a lack of effective preventative care. “We, like the community leaders gathered, were inspired by Dr. Osorio and spoke to her about how we could help,” said Barrios. “As students, we had little to offer in terms of funds, but wanted to support her by providing data that could be used as evidence of unmet health care needs in this community.”

With the encouragement of Osorio, Franco, and Diana Gueits, director of diversity and inclusion at Cleveland Clinic, the three students decided to develop a formal plan for assessing diabetes-related and other health care needs of the Hispanic population of Cleveland. They began the process by meeting with health care providers at Cleveland Clinic’s Stephanie Tubbs Jones Health Center who had recently implemented a diabetes intervention program in an underserved population of mainly African Americans. “We received some wonderful advice and guidance that we are using in our own work,” said Moussa.

The CWRU trio is beginning their efforts by conducting surveys of health care literacy and diabetes awareness in Cleveland’s west side, primarily via in-person interviews at grocery stores and Lutheran Hospital, as well as hard copy questionnaires. Next, they will convene focus groups to further identify health care concerns in the community. Using this information, as well as the Stephanie Tubbs Jones program and others as models, they will develop and help implement a diabetes-prevention and care initiative for Lutheran Hospital. “We hope that this will be an important step in realizing Osorio’s dream of creating a Hispanic clinic for addressing the unmet health care needs of the community,” said Barrios. “We don’t want to only collect data, as important as that is, but to also build the right team. So we’re recruiting first-year med students to be part of the longer term process.” Barrios, May and Moussa hope to have the initiative completed by the time they finish their medical education in three years’ time.
**Honors**

**David Bar-Shain, MD, assistant professor,** was the recipient of the Epic Corp.’s Physician Advisory Council PAcademy Award.

**Martin Basch, PhD, assistant professor,** has received the 2016 Hartwell Individual Biomedical Research Award for research on congenital deafness.

**George Bause, MD, clinical associate professor,** was awarded the Presidential Medallion by the Academy of Anesthesiology.

**Ronald Blanton, MD, professor,** was awarded the Environmental Influences on Urban Schistosomiasis Transmission and Elimination award from the National Institute of Health.

**Jeremy Bordeaux, MD, MPH, associate professor,** was elected to the Board of Directors for the American College of Mohs Surgery.

**Jianguo Cheng, MD, PhD, professor,** was named President-Elect of the American Academy of Pain Medicine.

**Vanessa El Kamari, PhD, postdoctoral researcher,** received the Young Investigator Award at the Conference on Retroviruses and Opportunistic Infections.

**Darcy Freedman, PhD, MPH, associate professor,** received the Editor in Chief’s Award for 2016 Paper of the Year by the American Journal of Health Promotion.

**Mahmoud Ghannoun, PhD, professor,** was elected to Fellowship in the American Academy of Microbiology.

**Abdulla Ghor, MD, associate professor,** was awarded the Parker J. Palmer Courage to Lead Award by the Accreditation Council for Graduate Medical Education for demonstrated excellence in overseeing residency programs.

**Timothy Gilligan, MD, MS, associate professor,** was named a Fellow of the American Society of Clinical Oncology.

**Wendy Goodman, PhD, instructor,** received the Mary Hellerstein Jr. Career Development Award from Case Western Reserve University School of Medicine.

**Mark Griswold, PhD, professor,** was awarded the 2017 Gold Medal award from the International Society for Magnetic Resonance in Medicine.

**Erika Hood, M.Ed,** was named Shared Use Ambassador by the Safe Routes to School National Partnership.

**Jennifer Hu, student, Tolu Rosanwo, student,** and **Erin Yamamoto, student,** were awarded a $1.942,679 NIH grant over 7 years.

**Kakul Joshi, MPH,** was awarded a $50,000 grant from the National Institute of Diabetes and Digestive and Kidney Diseases.

**Michael Gibson, MD, PhD, associate professor,** received funding from the National Comprehensive Cancer Network for his study on Second-Line Treatment of Recurrent/Metastatic Squamous Cell Carcinoma of the Head and Neck.

**Ann Harris, PhD, professor,** received a $825,000 grant from the National Institute of Diabetes and Digestive and Kidney Diseases.

**Patrick M. Catalano, MD, professor,** and **John Kirwan, PhD, professor,** received a five-year, $5.5M grant from the National Institute of Child Health and Human Development of the National Institutes of Health for the creation of the Lifestyle Intervention in Preparation for Pregnancy program (LIPP).

**Evan Deneris, PhD, professor,** received a $825,000 grant over 7 years.

**Jeffrey Albert, PhD, professor,** received a $1.58M grant from the National Institute of Dental and Craniofacial Research.

**Eileen P. Anderson-Fye, EdD,** was awarded a $19.916 National Science Foundation grant.

**Kath Bogie, PhD,** was awarded a $967,100 grant from the Department of Veterans Affairs Rehabilitation Research & Development Service.

**Nicole Ward, PhD, associate professor,** was awarded a $938,912 NIH grant over 7 years.

**Arlene Dent, MD, assistant professor,** was awarded a $938,912 NIH grant over 7 years.

**Pravin George, DO, clinical assistant professor,** received a $50,000 NI-CORE grant from the Cleveland Clinic.

**Jeffrey Albert, PhD, professor,** was awarded a Ten Clinical Research Achievement from the Clinical Research Forum.

**Sharon Stein, MD, associate professor,** was awarded the Richard E. Wetzman Award from the Endocrine Society.

**Mary Beth Kavanagh, MA, MS, clinical instructor,** received the Mary Hellerstein Jr. Career Development Award from Case Western Reserve University School of Medicine.

**James Kazura, MD, professor,** was awarded the John Irving Grant from the National Institute of Child Health and Human Development of the National Institutes of Health for the creation of the Lifestyle Intervention in Preparation for Pregnancy program (LIPP).

**Ann Harris, PhD, professor,** received a $1.6M National Heart, Lung, and Blood Institute grant over four years.

**Jeffrey Albert, PhD, professor,** was awarded a summer fellow award from the St. Baldrick’s Foundation for $5,000.

**Alex Huang, MD, PhD, associate professor,** was awarded a $150,000 grant from the St. Baldrick’s Foundation.

**Kakul Joshi, MPH,** was awarded a $2017 Medicine, Society and Culture Travel Grant from the Medical Humanities and Social Medicine Initiative.

**James Kazura, MD, professor,** received a grant from the National Institute of Allergy and Infectious Diseases valued at $2,973,911 over 5 years.

**James Kazura, MD, professor,** was awarded the Outstanding Young Alumni Award from the University of Alabama.

**Sharon Stein, MD, associate professor,** was awarded the Association of Women Surgeons Kim Ephgrave Visiting Professorship at the University of Alabama.

**Gloria Tavera, student,** was awarded the Outstanding Young Alumni Award from the University of Florida.

**Cheryl Thompson, PhD, assistant professor,** was elected Secretary/Treasurer of the American Society of Preventive Oncology.

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Anibar Sen Gupta, PhD, associate professor, received a $1,000,000 Defense Medical Research and Development Program Prolonged Field Care Research Award from the Department of Defense.

Carol Toris, PhD, professor, received a $40,000 Shaffer grant from the Glaucoma Research Foundation.

Erika Trapl, PhD, assistant professor, received a one-year, $240,000 Tobacco Disparities Demonstration Project grant from the Ohio Department of Health (ODH) that will work to reduce rates of smoking in three targeted neighborhoods in Cleveland.

Wayne Tsuang, MD, assistant professor, received a $100,000 Clinical Science Faculty Development Grant from the American Society of Transplantation.

**Publications**

Ramzi Alsallaq, PhD, was the lead author of “Quantitative assessment of the impact of partially protective anti-schistosomiasis vaccines,” published in PLoS Neglected Tropical Diseases.

Eileen P. Anderson-Fye, EdG, associate professor, was the author of “Fat Planet: Obesity, Culture and Symbolic Body Capital,” published by the University of New Mexico Press.

Jill Barnholtz-Sloan, PhD, professor, contributed to “Genome-wide association study of glioma subtypes identifies specific differences in genetic susceptibility to glioblastoma and non-glioblastoma tumors,” published in Nature Genetics.

Robert A. Bonomo, MD, professor, was the senior author of “Bacteremia due to Carbapenem-resistant Enterobacteriaceae (CRE): A Multicenter 2 Clinical and Molecular Epidemiologic Analysis in the Nation’s Epicenter for CRE,” published in Antimicrobial Agents and Chemotherapy.

Matthias Buck, PhD, professor, was the senior author of “Computational Modeling Reveals that Signaling Lipids Modulate the Orientation of K-Par4A at the Membrane Reflecting Protein Topology,” published in Structure.

Sudha Chakrpani, PhD, assistant professor, was the senior author of “Crystal structure and dynamics of a lipid-induced potential desensitized-state of a pentamer ligand-gated channel,” published in elife.

Alberto Costa, MD, PhD, professor, was the senior author of “Generation of Integration-Free Induced Pluripotent Stem Cells from Urine-Derived Cells Isolated from Individuals with Down Syndrome,” published in Stem Cells Translational Medicine.

Pravin George, DO, clinical assistant professor, was the lead author of “Nurses Are as Specific and Are Earlier in Calling In-Hospital Stroke Alerts Compared to Physicians,” published in the Journal of Stroke and Cerebrovascular Diseases.

Mahmoud Ghanoun, PhD, MBA, FIDSA, professor, was the senior author of “The Emerging Candida auris: Characterization of Growth Phenotype, Virulence Factors, Antifungal Activity, and Effect of SCI-078, a Novel Glucan Synthesis Inhibitor,” published in Radiology.

Vikas Gulani, MD, PhD, associate professor, was the senior author on “Development of a Combined MR Fingerprinting and Diffusion Examination for Prostate Cancer,” published in Radiology.

Sudha K. Iyengar, PhD, professor, was the senior author of “Genome-wide association study identifies three novel loci in Fuchs endothelial dystrophy,” published in Nature Communications.

Ruth Keri, PhD, professor, was the senior author of “Mitotic vulnerability in triple-negative breast cancer associated with LIN9 is targetable with BET inhibitors,” published in Cancer Research.


Donny D. Licatalosi, PhD, assistant professor, was the senior author of “Ptp2b controls an alternative splicing network required for cell communication during spermatogenesis,” published in Cell Reports.

Sharon Meropol, MD, PhD, assistant professor, was the lead author of “Incidence and Outcomes of Infections Caused by Multidrug-Resistant Enterobacteriaceae in Children, 2007–2015,” published in Journal of the Pediatric Infectious Diseases Society.

Goutham Narla, MD, PhD, associate professor, was senior author of “Activation of tumor suppressor protein PP2A inhibits KRAS-driven tumor growth,” published in The Journal of Clinical Investigation.

Maria Pagano, PhD, associate professor, was a contributing author of “Heroin use onset among nonmedical prescription opioid users in the club scene,” published in Drug and Alcohol Dependence.

Maria Pagano, PhD, associate professor, was senior author of “Residential proximity to electronic dance music nightclubs and associations with substance use, sexual behaviors, and related problems,” published in Journal of Drug Issues.

Krzysztof Palczewski, PhD, professor, was the senior author of “Phototopic behavior of rhodopsin induced by an atypical isomerization mechanism,” published in Proceedings of the National Academy of Sciences.

Jun T. Park, MD, assistant professor, was the lead author of “CD40 in Retinal Müller Cells Induces P2X7-Dependent Cytokine Secretion,” published in Investigative Ophthalmology and Visual Science.

Tony Wynshaw-Boris, MD, PhD, professor, was the co-author of “Human IPSC-Derived Cerebral Organoids Model Cellular Features of Lissencephaly and Reveal Prolonged Mitosis of Outer Radial Glia,” published in Cell Stem Cell.

Would you like to see your honor, award, or grant listed here? Be sure to submit your news to somnews@case.edu for inclusion in future issues and online.
Left brain | Right brain

The art of science
Human induced pluripotent stem cells, while being differentiated to neural lineages, incidentally assumed the shape of a heart. Dense foci of neural progenitors appear to divide the "heart" into "chambers," and bundles of neurons extend outward like "vessels."

by: ZACHARY NEVIN
Medical Scientist Training Program '19