

The Power of a **MOMENT**



SCHOOL OF MEDICINE
CASE WESTERN RESERVE
UNIVERSITY

CONTENTS

- 02** Dean's Letter
- 04** Research
- 24** Education
- 28** Grants
- 32** Medicine in Action
- 34** Technology and Innovation
- 36** News
- 38** Faculty Achievements
- 40** Financials and Statistics

The Power of a MOMENT

A breakthrough moment in the lab can lead to an infinite number of healthier moments across the globe. The moment a researcher makes a discovery creates a ripple effect that influences what medications are prescribed to hundreds, foods are eaten by thousands, and health habits are adopted by millions.

One moment of research can change the direction of medicine. One moment of outreach can change the health of a community. One moment of education can begin a waterfall of new knowledge.

WHAT CAN A MOMENT BE?

Strong, Critical, Experimental, Controversial,
Detailed, Beneficial, Risky, Elaborate, Revealing,
Intimate, Essential, Innovative, Progressive,
Beautiful, Intense, Astonishing,

Powerful.



REFLECTIVE /

When we start an arduous journey, our tendency is to focus on the next step, and the next, and the next. On many an occasion, we are so focused on the path ahead that we lose sight of the one already traveled. All too frequently, it is not until we pause for a breath that we even begin to realize how far we have come.

I usually apply this maxim to hard weekend hikes. But as I reviewed this report, I found the concept just as relevant to the past year at our School of Medicine. Each day we teach, treat, study and, in our very best moments, break through to new discoveries and understanding. Yet, amid the bustle of every unremitting hour, it is all too easy to focus on what is yet to do—as opposed to all we have done.

This annual report represents the antidote to that absent pause. Try to turn these pages without taking a minute to look more closely at one entry or another—it's all but impossible. Sometimes an image will stop you, or a headline, or even a familiar name. No matter what in particular draws your attention, the words you read will provide a rich example of meaningful progress. You will witness one more step toward illuminating the impact of individual medications, or imaging innovations or even approaches to defeat complex disease.

As the individual stories accumulate, you will marvel at the inventiveness of our researchers, the dedication of our educators, and the achievements of our students. Together, the accounts create a rich portrait of a place filled with incomparable talent, passion and vision. We believe that a lone individual can make a positive difference for others. We believe that an entire community of such people transforms lives, regions and, ultimately, our nation at large.

I am honored to take these steps with the faculty, staff and students of our School of Medicine. And I am awed to look back at how far we have come. Appreciate the journeys chronicled in these pages; perhaps you will be moved to join us on the next ones we take. I can promise you this—the view is always inspiring.



Pamela B. Davis

Dean, School of Medicine

Vice President for Medical Affairs,
Case Western Reserve University

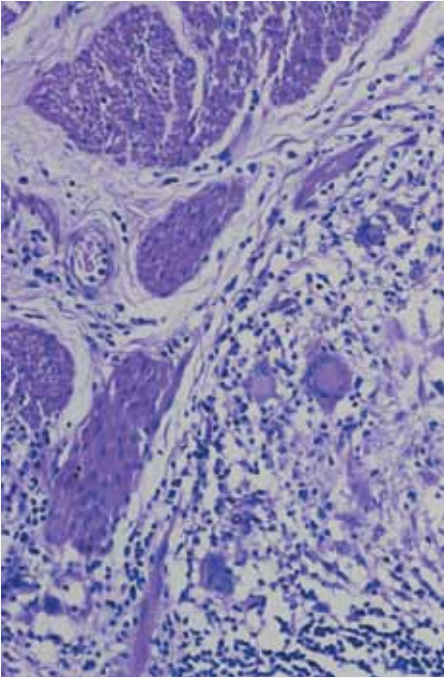
Arline H. and Curtis F. Garvin, MD,
Research Professor



HEALTHY /

Moments in our labs are balanced with moments working with our community to increase health and health care access. This year, the **School of Medicine reaffirmed its long-standing commitment to community wellness with the creation of the Weatherhead Institute for Family Medicine and Community Health**, which will serve as an inclusive home for our myriad outreach efforts. George Kikano, MD, will lead the institute. Included among its offerings is the new Urban Health Initiative, led by Amy R. Sheon, PhD, MPH, a program that optimizes the school's partnerships with community organizations to address the many health challenges faced by urban residents. These efforts will build on hundreds of existing programs, including the \$12.5-million NIH-funded effort to reduce obesity and high blood pressure among Cleveland youth. This study assesses the effectiveness of behavior-based interventions to increase healthy habits in children. Teaming with the Cleveland Metropolitan School District and the YMCA of Greater Cleveland, the study brings additional support for efforts like the We Run This City Youth Marathon Program, which encourages kids like Nathan to train and participate in the Cleveland marathon. Additionally, the Urban Health Initiative seeks to expand on programs that have improved local care for diabetes, heart failure and hypertension, which has already led to savings in hospital costs.

Moments in MEDICATION RESEARCH



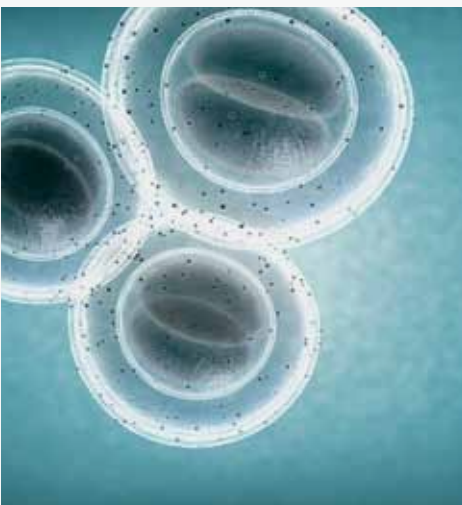
Two drugs commonly used to fight cancer could be used in the treatment of Crohn's disease and sarcoidosis, according to researchers at Case Western Reserve School of Medicine. The medications erlotinib and gefitinib, commonly used to inhibit the growth of lung and brain tumors, were also found to be successful in diminishing the hyperactivity of NOD2—a gene that plays a key role in both Crohn's disease and sarcoidosis.

>> A team of researchers, including the School of Medicine, showed that intensive control of blood glucose levels does not reduce the likelihood of cardiovascular disease for those with long-term type 2 diabetes already at risk for heart problems. Further new analysis led by Faramarz Ismail-Beigi, PhD, shows that such **strict blood-sugar control in patients with long-term type 2 diabetes could slow the progression of eye disease, as well as benefit kidney and peripheral-nerve health.**

>> A meta-analysis of randomized controlled trials of a highly popular class of high-blood-pressure medications called angiotensin-receptor blockers (ARBs) showed that **patients taking ARBs have an 11 percent increase in the risk of developing cancer** over a four-year period compared with control patients. The risk of lung cancer was increased by 25 percent with ARBs. This analysis triggered a review of these drugs by the FDA and the European Medicines Agency.

>> Medications that have raised safety concerns over heart attack and stroke risks may not have received FDA approval if the cardiovascular effects of fluid retention had been better understood, according to Robert P. Blankfield, MD. His research shows **fluid retention may explain the increased risk of heart attacks and strokes of many medications**, including Vioxx, Bextra and Avandia—which cause fluid retention as a side effect. The research was able to demonstrate that fluid retention increases the likelihood that blood will flow in a turbulent manner—regardless of whether blood pressure is raised—which accelerates atherosclerosis.

The drug sitagliptin, used to treat diabetes, could also be effective in preventing the development of the disease in prediabetics by raising the total output of insulin by the pancreas and lowering glucagon levels, according to research by Paul Ernsberger, PhD.



>> School of Medicine researcher Menachem Shoham, PhD, identified **new anti-virulence drugs that render the bacteria Methicillin Resistant *Staphylococcus Aureus* (MRSA) harmless** by preventing the production of toxins that cause disease. Shoham identified a bacterial protein, AgrA, as the key molecule responsible for the release of toxins and was able to block its activation. Because the treatment does not kill the bacteria, resistance is not anticipated to develop, as it has with antibiotics.



DECEPTIVE /

The moment we decide what to eat is frequently influenced by packaging labels. And new research uncovers that trans-fat food labeling can be misleading. Case Western Reserve School of Medicine student Eric Brandt discovered that **current FDA guidelines—which allow companies to round down food containing less than 0.5 grams of trans fat to 0 grams—make it easy for consumers to exceed the daily recommended value of 1.11 grams** without ever knowing it. “Food companies would prefer their products to look healthier than they are,” says Brandt. “And a revision to the law has yet to be suggested.” Trans fats have been linked to elevated cholesterol and an increased risk of coronary heart disease, sudden cardiac death and possibly diabetes.

Moments of DIET AND DISEASE

Researchers led by Fabio Cominelli, MD, PhD, were able to discern the mechanisms by which probiotics increase intestinal health. The team proved that a high-dose mixture of eight different bacterial strains could prevent the onset of intestinal inflammation through the local stimulation of epithelial innate immune responses.

>> School of Medicine researchers discovered a **link between high-fat diets and prostate cancer**. The research team, led by Sanjay Gupta, PhD, found direct evidence that a high-fat diet can cause inflammation and oxidative stress, which can lead to a range of prostate problems. Diet is considered one of the most controllable risk factors for prostate cancer—which is the second-leading cause of cancer-related deaths in men—and other prostate diseases like benign prostatic hyperplasia and prostatitis.

>> Despite popular belief, eliminating or severely limiting fats from the diet may not be beneficial to cardiac function in patients with heart failure, according to research by Margaret Chandler, PhD. In a biologic model of heart failure, **a high-fat diet improved the heart's ability to pump** while being accompanied by cardiac insulin resistance. This suggests a damaged heart could benefit from a balanced diet—one with fats and complex carbohydrates—while maintaining the heart's normal metabolic phenotype.



>> **Why do some individuals suffer from salt-induced high blood pressure while others don't?** A team of researchers from the School of Medicine and Kent State University uncovered the underlying mechanisms, finding that salt intake raises blood pressure by making it harder for the cardiovascular system to simultaneously juggle the regulation of blood pressure and body temperature. Salt-sensitive individuals are better able to maintain their core body temperature equilibrium after ingesting salt, but tend to experience an increase in blood pressure in the process.

Moments in GENETICS

>> Using new gene targeting approaches, researchers led by Evan Deneris, PhD, have discovered that the **transcription factor gene Pet-1 works through the entire lifespan to help develop and maintain the serotonin system**. The level of serotonin in the brain has been implicated in many psychiatric disorders, so research into Pet-1 could be key for understanding the causes of these conditions.

>> School of Medicine researchers discovered that two deadly diseases of the heart and blood vessels are influenced by the same genetic factor: KLF15. **The absence of the Kruppel-like factor 15 (KLF15), combined with stress, leads to both heart failure and aortic aneurysm**, according to the research. The discovery of a shared molecular mechanism for both diseases, typically treated independently, offers new promise for treatment options.

>> **Manipulating a genetic factor to launch or suppress the body's defenses can improve survival rates for sepsis infections**, according to research led by Ganapati H. Mahabaleshwar, PhD, and Mukesh K. Jain, MD. The findings recommend pursuit of therapies to reduce the amount of the Kruppel-like transcription factor 2 in the first phase of infection, and other compounds to bolster its levels in the second phase of the disease.

The genetic factor KLF4 can regulate obesity-induced inflammation, which contributes to chronic health problems, School of Medicine researchers discovered.

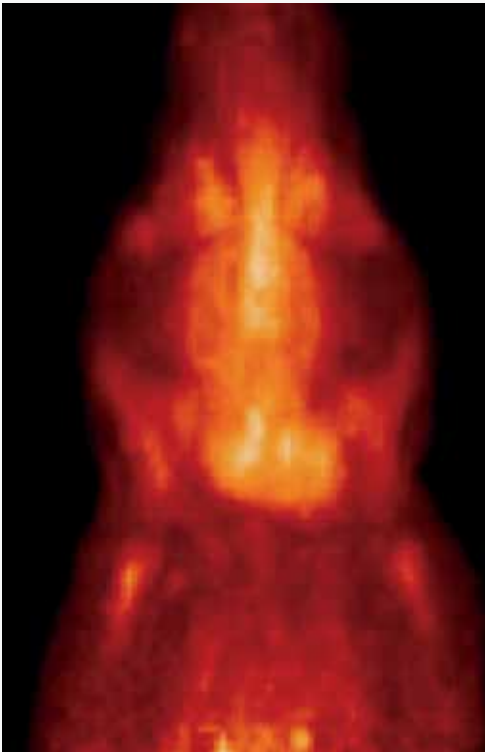
>> An international team, including Case Western Reserve School of Medicine researchers led by Mitchell Drumm, PhD, **discovered regions of the genome that impact the severity of cystic fibrosis**, the most common lethal genetic disease affecting children in North America. The findings provide insight into the causes of the wide variation in disease severity and point the way to new diagnostic markers and therapeutic approaches for this and more common lung diseases like asthma and chronic obstructive pulmonary disease. The study is one of the first to scan the entire genome for a single genetic disorder.

INFLUENTIAL /

New research suggests it might be good for teens to take a moment to unplug. Scott Frank, MD, MS, has discovered a **link between excessive texting and social networking and risky health behaviors in teenagers**. Frank found that teens who hypertext—send more than 120 messages per school day—are more likely to have tried cigarettes, alcohol and drugs, and to be sexually active, compared with their peers who aren't hypertexters. Teens who spend excessive amounts of time on social networking sites like Facebook—more than three hours per school day—were found to face the same elevated risks, as well as higher levels of stress, depression, suicide, poor sleep and poor academic performance. "When left unchecked, texting and other widely popular methods of staying connected are associated with unhealthy behaviors among teenagers," says Frank. "This may be a wake-up call for parents to open a dialogue with their kids about the extent of texting and social networking they are involved with and about what is happening in the rest of their lives." Frank's research was presented at the American Public Health Association's Annual Meeting and Exposition in November 2010.



Moments in IMAGING



>> **A new imaging agent developed by scientists at the School of Medicine gives a direct view of the inner workings of live nerves in the brain.** The Case Imaging Compound helps visualize changes in myelin membrane, a material that defines characteristics of vertebrates and is essential to the proper function of the nervous system. Destruction or changes in myelin cause a number of neurological disorders, including multiple sclerosis. Previously, myelin changes could only be evaluated through in-vitro or postmortem tissue staining. The new agent allows for the detection and quantification of myelin changes in live subjects for the first time. It also provides a powerful imaging tool in drug discovery and development to identify promising therapies for clinical trials.

>> Researchers led by Mark Chance, PhD, have captured the **first high-resolution image of a potassium channel**, giving them a detailed look at the mechanisms that control heart functions, nerve signaling and how medications work. Using chemical labeling and mass spectrometry-based techniques, the researchers took the picture of the channel—which controls the flow of potassium ions between cells—in its open state.

Using powerful X-rays, researchers have discovered a way to examine water molecules hidden deep inside proteins, giving them a unique look at how cells transmit information.

Moments in PRION RESEARCH

School of Medicine researchers identified prion as a new biomarker for pancreatic cancer. Their findings showed that in human pancreatic cancer cells, prion is incompletely processed and binds to the molecule filamin A, which disrupts the cell's organization and signaling and leads to aggressive tumor-cell growth. Expression of prion is also a marker of poorer prognosis in patients with pancreatic cancer.

>> **The interaction of the amyloid beta 42 peptide with the prion protein could be a key factor in the development of Alzheimer's disease.** Wen-Quan Zou, MD, PhD, and team demonstrated that amyloid beta binds preferentially to an insoluble form of prion protein in the brain of individuals with Alzheimer's, and were able to identify two types of binding sites on the human prion protein molecule, which could help develop a new therapeutic strategy for the disease.

>> **A new sporadic prion protein disease—variably protease-sensitive prionopathy (VPSPr)—was discovered by School of Medicine researchers to affect patients with all three types of the prion protein gene.** VPSPr shares certain genetic characteristics with Creutzfeldt-Jakob disease, the most common form of human prion disease, but other traits suggest VPSPr may be caused by a different mechanism more akin to other neurodegenerative disorders like Alzheimer's disease.

>> School of Medicine researchers have **identified the first disease-specific biomarker for sporadic Creutzfeldt-Jakob disease (sCJD)**, a universally fatal, degenerative brain disease with no cure. One of the causes of dementia, sCJD typically leads to death within a year of disease onset. The team, led by Neena Singh, MD, PhD, found that levels of the iron-transport protein transferrin are significantly decreased in the cerebrospinal fluid of sCJD patients well before the end stage of the disease. The finding provides a basis for developing a test to diagnose sCJD while patients are still alive.

EYE-OPENING /

One moment of discovery has changed an almost century-old understanding of malaria disease transmission. School of Medicine researchers led by Peter A. Zimmerman, PhD, in conjunction with the Pasteur Institute and the Madagascar Ministry of Health, discovered that **those with a Duffy negative blood type are no longer resistant to *Plasmodium vivax*, the most common species of malaria.** In the early 1920s, it had been determined that individuals of African descent were highly resistant to *P. vivax*, which was determined in the 1950s to be due to their Duffy blood type negativity. But when the research team collected samples from individuals in Madagascar, they discovered that 10 percent of those infected with *P. vivax* were Duffy negative. Researchers think the evolution of new parasite strains and population mixing are the reasons for this development.





Moments in INFECTIOUS DISEASES

A combination of drugs could succeed where traditional antibiotics have failed in treating drug-resistant bacteria, according to researchers led by Robert A. Bonomo, MD. The combination of the antibiotic ceftazidime and a compound called NXL104 successfully treated highly resistant strains of *Klebsiella pneumoniae*.

>> One-third of the world's population is infected with *Mycobacterium tuberculosis*, the bacteria that causes most cases of TB. While most recover from TB infection, the bacteria can lie dormant, hiding in the body's immune cells for years before reactivating. Clifford V. Harding, MD, PhD, W. Henry Boom, MD, and colleagues recently **discovered how the TB bacterium is able to survive within the immune system** and inhibit the ability of macrophages to stimulate infection-fighting responses. The discovery can provide insights for designing TB therapies.

>> Case Western Reserve School of Medicine researchers have developed techniques to quickly identify the evolution of drug-resistant malaria strains. Tailoring genetic assays and mathematical analysis, the investigators have **developed a system to identify and track drug resistance of the deadliest form of malaria**, caused by the parasite *Plasmodium falciparum*. The method may enable the medical community to react quickly to the inevitability of resistance and save lives while increasing the lifespan of drugs used against the disease. Rather than months of clinical trials, the new method can provide information in just days, and at a fraction of the cost.

Case Western Reserve School of Medicine was chosen to lead an International Center of Excellence for Malaria Research by the National Institute of Allergy and Infectious Diseases. The designation includes a \$7.9-million grant to accelerate the control of malaria and help eliminate it worldwide.

Moments in HIV/AIDS RESEARCH

>> Researchers at the School of Medicine, led by Jacek Skowronski, PhD, **discovered a long-sought cellular factor—a protein called SAMHD1—that works to inhibit HIV infection of myeloid cells**, a subset of white blood cells that displays antigens and hence is important for the body's immune response against viruses and other pathogens. The protein's identification may help explain why some individuals can control HIV infection better than others.

>> Denis Tebit, PhD, and Eric Arts, PhD, were able to **track how HIV has changed and spread over the past 100 years**, which has implications for predicting how the virus might continue to evolve—and how effective vaccines might be developed.

The Case Western Reserve University/University Hospitals Center for AIDS Research received a five-year, \$9-million NIH renewal grant.

>> The School of Medicine and Cleveland Clinic received a \$3-million grant from the Richard J. Fasnmyer Foundation to continue HIV/AIDS research collaboration.

>> **Health care providers are missing key opportunities to test patients for HIV**, according to research conducted by Ann Avery, MD. By analyzing hospital and primary-care visit data, Avery found that many patients were never tested for HIV and those who test positive for HIV had been seen at a hospital or clinic previously where they could have been tested, but weren't.

>> The Case Western Reserve University/University Hospitals AIDS Clinical Trials Unit is **participating in a nationwide HIV vaccine clinical trial** (HVTN 505) being conducted by the HIV Vaccine Trials Network. The trial is testing the safety and effectiveness of a combination of two HIV vaccines to see if they will stimulate an immune response to HIV to decrease the amount of virus in the blood if a person later becomes infected. Neither vaccine can cause HIV infection.

>> School of Medicine researcher Jonathan Karn, PhD, **developed the first robust research model of HIV latency**, which allows for isolation of large homogeneous populations of latently infected resting memory T cells.



BREATHTAKING /

Every moment of breathing for patients with upper spinal cord injuries could become a lot easier with a breakthrough made by neuroscientist Jerry Silver, PhD, who was able to **restore 80 to 100 percent of breathing function in a biologic model by bridging the site of spinal cord injury** to reestablish lost nerve connections to the diaphragm. Making the therapy a success was the addition of an enzyme to a traditional peripheral nerve graft, which broke down the scar tissue that typically inhibits grafts from working on these types of injuries. The enzyme Chondroitinase ABC opened pathways through the scar tissue, and Schwann cells inside the graft guided and supported regeneration of the severed spinal nerves. Restoration of breathing is the top desire of people with upper spinal cord injuries, as respiratory infections—which attack through the ventilators they rely on—are their top killer. Silver and his team hope to quickly move the nerve bridge into clinical trials.

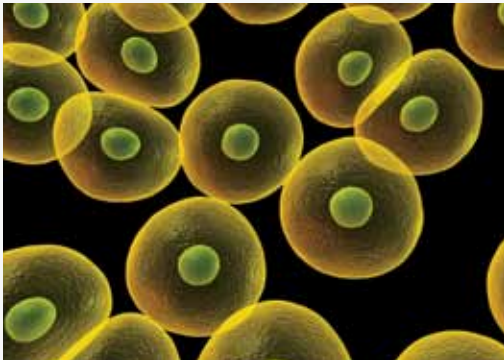
More Moments of DISCOVERY

>> The onset of epilepsy can have a lasting impact on cognitive development in children, according to research led by Philip Fastenau, PhD. **Children with normal IQs prior to experiencing a first seizure were found to develop problems with language, memory, learning and other cognitive skills.** The study also found that at the initial clinic visit after first seizure, academic achievement was not yet affected, suggesting that early intervention could help prevent a negative impact on performance at school.



>> Though “leaded” hasn’t been an option at the pump in the United States for 15 years, the **decades-long use of leaded fuel was found to be responsible for about two-thirds of toxic lead ingested or inhaled by African-American children in Cleveland** during the latter two-thirds of the 20th century, according to emeritus professor Norman Robbins, MD.

While conducting research on the metabolism of 4-hydroxyacids (products of lipid peroxidation and drugs of abuse), a research team led by Henri Brunengraber, MD, PhD, identified two previously unknown metabolic pathways that act on these chemicals.



>> Led by Eckhard Jankowsky, PhD, researchers at the School of Medicine **identified a cellular mechanism critical in maintaining normal cell function**. Examining the function of TRAMP, a protein complex involved in the processing of RNA, they were able to identify a key function for the protein Mtr4p in a process that initiates the degradation of select RNAs.

Bruce T. Lamb, PhD, discovered that inflammation promotes the accumulation of tau proteins, which is known to lead to tauopathies, the family of neurological disorders that includes Alzheimer's.

>> In a meta-analysis, School of Medicine researchers found that **three-lead cardiac pacemakers fail to help 40 percent of heart-failure patients** who have them implanted. Patients with less severe electrical disturbance in their hearts were found to receive no benefit from the expensive and potentially risky implants. In light of the findings, principal researcher Ilke Sipahi, MD, has called for a change in current treatment guidelines.

>> Biochemist Michael Weiss, MD, PhD, created a **new formulation of long-acting insulin that reduces the risk for cancer** associated with other insulin products. Applying innovative biomedical engineering principles, Weiss and his team created a "smart" insulin molecule that binds less tightly to cancer-related receptors than ordinary insulin and "staples" under the skin via bridging zinc ions to provide a slow-release therapy.



SHARED /

A single moment of effective communication between physicians and nurses can significantly impact the quality of care for millions of patients. With this in mind, **the university's School of Medicine and Frances Payne Bolton School of Nursing are working together to incorporate communication skills into their curriculums.** With a grant from the Josiah Macy Jr. Foundation, the new Interprofessional Learning Exchange and Development (I-LEAD) program trains future doctors and nurses to work as a team. Hands-on training includes simulation exercises to practice effective health care communication with life-like patient simulators in real-world situations. The program seeks to build strong relationships between medical and nursing education, and become a curriculum model to be used nationwide.

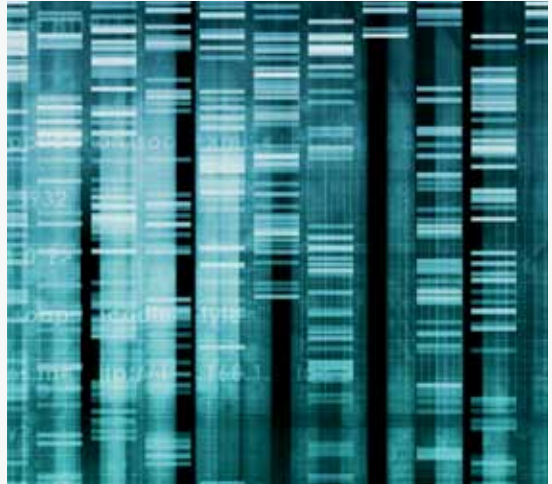
Moments in EDUCATION



>> The Department of Bioethics expanded its offerings of short-term study abroad partnerships with academic institutions across the globe this year, giving students even more opportunities to **see how ethical issues in medicine and the life sciences are addressed in different ways around the world**. Trips to France, the Netherlands, India, Spain, Argentina and Costa Rica give students a chance to ponder different approaches to beginning and end-of-life issues, the intersection of religion and medical decision-making, social stigmas of various diseases, patient privacy rights and more. The courses are open to all undergraduate and graduate students from Case Western Reserve, as well as students from other universities. The courses attract students from both the bioethics graduate program and MD candidates, as well as students from law, social work, economics, business, history, biology and English.

Case Western Reserve School of Medicine students won many prestigious fellowships this year, including ones from Doris Duke, Sarnoff, Howard Hughes Medical Institute and the Clinical Research Training Program at the NIH.

>> **A new longitudinal integrated clerkship gives third-year medical students the chance for greater continuity with patients and faculty advisors in a coordinated health care system.** Completing their entire Core II family medicine/pediatrics/obstetrics rotation at a single site over the course of 16 weeks provides a unique opportunity for professional growth and the development of meaningful learning relationships. The Kaiser Permanente health system also gives students an opportunity to focus on primary-care ambulatory medicine in a managed-care, centralized organization—a different kind of system than tertiary care hospitals. This longitudinal, relationship-based approach to clerkship education is gaining attention in medical schools in the United States and around the world, and has shown promise for encouraging a more humanistic approach to patient care, says Daniel Wolpaw, MD, director of Undergraduate Clinical Education for the University Program.



>> **In 2011, the School of Medicine established the first PhD and MS program in Systems Biology and Bioinformatics in the State of Ohio.** Systems biology represents a new scientific concept of increasing importance, with a goal of understanding the integration of individual pieces of biological systems into networks, complexes and the biological organizations critical to cellular and organism function and development. Bioinformatics represents a set of computational approaches to data analysis. Together, the merger of computational and quantitative thinking in the context of biological integration is a foundation of the new educational program, and an essential area for expertise in the next generation of medical research.



TRANSITIONAL /

The moment to make the switch from paper to electronic medical records came into easier reach this year for thousands of area private practitioners and small practices. With a nearly \$8-million federally funded grant via the Ohio Health Information Partnership, Case Western Reserve School of Medicine became a regional extension center to **help more than 1,700 health care providers in surrounding counties adopt electronic medical records**. Taking advantage of the program, nephrologist Jeff Lautman, MD, and practice manager Teri Lautman, MBA, selected an electronic record system this year for their Cuyahoga-County-based practice with partner Ari Mosenkis, MD. Integrating electronic health records into practices has been shown to both improve patient care and lower health care costs.

Moments in NEW RESEARCH FUNDING

\$3M grant from the Richard J. Fasnemyer Foundation to continue research collaboration between two nationally renowned HIV immunologists: Michael Lederman, MD, co-director of the Case Western Reserve University/University Hospitals Center for AIDS Research, and Leonard Calabrese, DO, head of Cleveland Clinic's Section of Clinical Immunology. Lederman and Calabrese have been working together for nearly 30 years in the **fight against HIV and AIDS**.

\$2.3M NIH Director's New Innovator Award to biomedical engineering professor Erin Lavik, ScD, to support her work on **synthetic blood platelets** that bind with the body's own platelets to stop bleeding faster.

\$10M from the National Eye Institute to develop **new treatments for retinal disease**, a leading cause of blindness.

\$1.6M from the National Cancer Institute to **study how tumor cells avoid detection** by the body's immune system.

\$4.7M from the Defense Advanced Research Projects Agency to develop a new class of drugs to **help soldiers perform better at high altitudes**. The research could also help develop new therapies for patients suffering from conditions where oxygen delivery is impaired.

\$7.9M from the National Institute of Allergy and Infectious Diseases to lead an International Center of Excellence for Malaria Research to accelerate the **control of malaria** and help eliminate it worldwide.

\$2.6M from the National Institute of Diabetes and Digestive and Kidney Diseases as a Merit Award to Maria Hatzoglou, PhD, to study a **novel signaling mechanism that promotes cell death** in response to stress.

\$2.5M from the National Institute of Diabetes and Digestive and Kidney Diseases to study intestinal inflammation to help develop **new treatments for Crohn's disease and ulcerative colitis.**

\$9M from the NIH as a renewal grant for the Case Western Reserve University/University Hospitals **Center for AIDS Research.**

\$2.5M from the National Cancer Institute to help the Case Comprehensive Cancer Center study ways to **improve chemotherapy for glioblastoma multiforme**—a common and aggressive form of brain cancer.

\$3M from the Mt. Sinai Health Care Foundation to help **recruit star science researchers and faculty** to the School of Medicine.

\$1M Ohio Third Frontier grant to support research on the treatment of **spinal cord injuries.**

\$12.5M from the NIH to **reduce instances of obesity and high blood pressure in urban youth** in Cleveland—where the overweight and obesity rate is almost 40 percent.

\$5M from the Ohio Third Frontier to fund the **Global Advanced Imaging Innovation Center**, a collaboration between Case Western Reserve School of Medicine, University Hospitals Case Medical Center and Philips Healthcare.

\$7.8M from the National Institute of Mental Health as a renewal grant for the long-term study of **manic symptoms in children.**

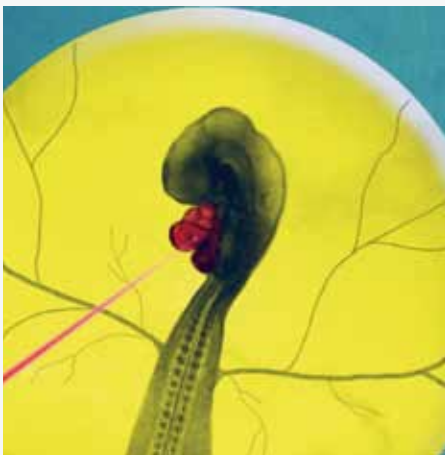
\$2.5M from the National Human Genome Research Institute to the **Center for Genetic Research Ethics and Law** in the form of a continuation grant.

CRUCIAL /

A moment of quick and efficient battlefield medical care can mean faster recovery, maintained functionality, even a greater chance for survival. To keep soldiers healthier at vital moments, the School of Medicine teamed up with Army Reserve medical units from the 256th Combat Support Hospital in Twinsburg, Ohio, **to provide medical combat readiness training at the school's Mt. Sinai Skills and Simulation Center.** The exercise was part of a study by Dynamics Research Corporation under a Department of Defense grant to determine if civilian medical simulation facilities can train troops for combat medical operations. In the training, nurses and medics were able to prepare for active duty using life-like manikins in combat scenarios such as soldiers with shrapnel-blast injuries and children with multiple trauma wounds and third-degree burns. The exercise gave reservists access to a realistic scenario they don't have in their training centers and the opportunity to enhance their communication and team-building skills.



Moments in TECHNOLOGY AND INNOVATION



>> **With a pulsing infrared laser, scientists at Case Western Reserve and Vanderbilt University were able to pace the contractions of an avian embryonic heart**, with no apparent damage to the tissue. The noninvasive device may prove an effective tool in understanding how environmental factors that alter an embryo's heart rate lead to congenital defects, as well as potentially lead to the development of a pacemaker for a child's or baby's heart—or even a device that could be used in utero.

University spin-off and bioinformatics company NeoProteomics secured an exclusive license agreement with the School of Medicine for biomarker technology to help enhance various forms of personalized treatment for cancer, diabetes and inflammatory disease.

>> With the goal of developing new, more effective and personalized cancer treatments, UK-based translational genomics company **Horizon Discovery has secured from the university exclusive rights to a panel of new human isogenic cell models** developed by the lab of Zhenghe John Wang, PhD. The lines of genetically engineered cells enable researchers to tag and track cancer-related proteins, which can help researchers better understand how cancer manifests itself and identify the effects of drug therapies.

NOVEL /

Insulin injections are powerful moments for the 180 million people worldwide who need them to control their diabetes. But insulin must be shipped and stored in refrigerators—a challenge in developing countries and for mail-order prescription programs in the United States. Biochemist Michael Weiss, MD, PhD, **invented an ultra-stable insulin molecule that remains potent for months—even at high temperatures.** In 2009, Case Western Reserve licensed that technology to start-up Thermalin Diabetes, LLC, which is now developing long-acting versions and formulations that could speed absorption of insulin 30-50 percent. Thermalin also has created “insulin analogs” that can be highly concentrated without slowing absorption—potentially changing the lives of tens of thousands of individuals whose insulin resistance means they must now take painfully large injections. Thermalin has won \$2.3 million in NIH grants, raised \$2.9 million in private capital, and entered into several partnerships to help test its formulations. The company hopes to begin human studies by 2013.

FLEETING /

Sometimes the power of a moment stems from the power of circumstance. For instance, how do cultural and economic shifts toward a more western lifestyle take their toll on health? A new research agreement between Case Western Reserve School of Medicine and the Shanghai Zhabei District Health Bureau in China seeks to find out. **The school and the health bureau signed a unique 10-year research agreement to examine the growing incidence of cancer, cardiovascular disease, diabetes and obesity in China,** which come at a unique moment in time when Chinese urban culture is adopting a more western lifestyle. The agreement builds upon an existing partnership between the two, which already has produced a baseline survey of biological and epidemiological information of 48,000 Zhabei residents.

Moments of CURRENT EVENTS

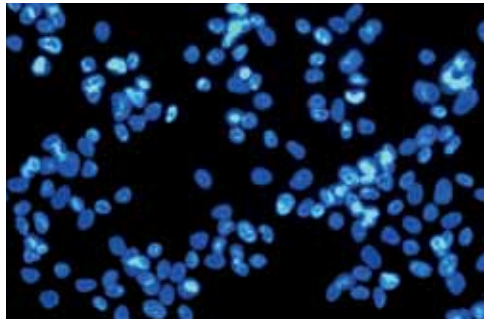
>> The Case Western Reserve School of Medicine community mourned the loss of **renowned Alzheimer's researcher and revered mentor and colleague Mark A. Smith, PhD, who died Dec. 21, 2010**, after he was struck by a car. Smith joined the university in 1994 and launched an academic career that drew international attention and accolades for his work focused on understanding how and why neurons cease to function in cases of neurodegenerative diseases. He published more than 800 peer-reviewed articles, and his work was cited more than 21,000 times. Smith served as editor-in-chief of the *Journal of Alzheimer's Disease* and was the recipient of numerous awards.

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This spring, the School of Medicine appointed Carol L. Moss as vice president for medical development and vice dean for external affairs.

.....

>> The School of Medicine's National Center for Regenerative Medicine teamed up with Edheads, a provider of online education tools, to **launch web-based education modules about stem cells**. Based on real clinical trials, the modules are geared toward high school students and designed to enhance classroom curriculum.



>> The National Center for Regenerative Medicine and the Center for Stem Cell and Regenerative Medicine, both at Case Western Reserve, joined forces in the spring of 2011 to become **a single entity—the National Center for Regenerative Medicine (NCRM)—within the School of Medicine**. About 125 members from University Hospitals Case Medical Center, Cleveland Clinic, Ohio State University, Case Western Reserve and commercial partners collaborate on new therapy development. The NCRM is currently bringing together multiple clinical partners and the school to assess a new stem-cell therapy for patients with multiple sclerosis. Led by Jeffrey Cohen, MD, the clinical trial pulls from patients at Cleveland Clinic, who visit the Dahms Clinical Research Unit at University Hospitals to have bone marrow extracted. Cells from that bone marrow are taken to the NCRM cell production facility at the School of Medicine, where they are grown and prepared before being transported to Cleveland Clinic to be infused back into the patient.

Moments of ACCOLADES

**Nora Nock, PhD, and
Cheryl L. Thompson, PhD**
Transdisciplinary Research on Energetics and
Cancer Centers Trainee Award for Excellence

Michael Lederman, MD
Mt. Sinai Health Care Foundation
Maurice Saltzman Award

Robert T. Ballock, MD
Pediatric Orthopaedic Society of North
America Arthur H. Huene Memorial Award

Michael D. Smith, MD
American College of Emergency Physicians
National Emergency Medicine
Faculty Teaching Award

Keming Gao, MD, PhD
National Alliance for Research on
Schizophrenia and Depression Young
Investigator Award

Paul Tesar, PhD
New York Stem Cell Foundation Robertson
Investigator

Charis Eng, MD, PhD
Elected to the Institute
of Medicine

Erin Lavik, ScD
NIH Director's New
Innovator Award

Stephen M. Maricich, MD, PhD
Child Neurology Society
Young Investigator Award

**Benigno Rodriguez, MD, and
Carlos Subauste, MD**
Elected fellows to the Infectious
Disease Society of America

Mitchell Drumm, PhD
Cystic Fibrosis Foundation
Paul di Sant'Agneses Distinguished
Scientific Achievement Award

Walter Boron, MD, PhD
American Physiological Society
Ray G. Diggs Award;
George E. Palade Gold Medal Award

Jeffrey L. Duerk, PhD

International Society for Magnetic Resonance
in Medicine Silver Medal Award

Lee Ponsky, MD

2011 Leonard Tow Humanism in Medicine
Award

Brian Grimberg, PhD

International Society for Advancement of
Cytometry Scholar

Maria Hatzoglou, PhD

NHLBI Method to Extend Research
in Time (MERIT) Award

**Jerry Silver, PhD,
James M. Anderson, MD, PhD,
Thomas A. Hamilton, PhD,
Qing Kenneth Wang, PhD, and
Pierluigi Gambetti, MD**

Elected fellows to the
American Association for the
Advancement of Science

**Robert Bonomo, MD, and
Jonathan Karn, PhD**

Elected fellows to the American
Academy of Microbiology

Saul Genuth, MD

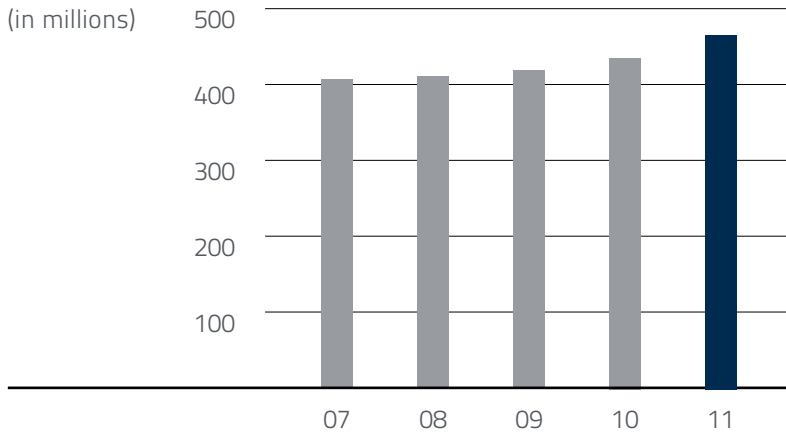
National Institute of Diabetes and
Digestive and Kidney Diseases Outstanding
Achievement Award

David C. Kaelber, MD, PhD

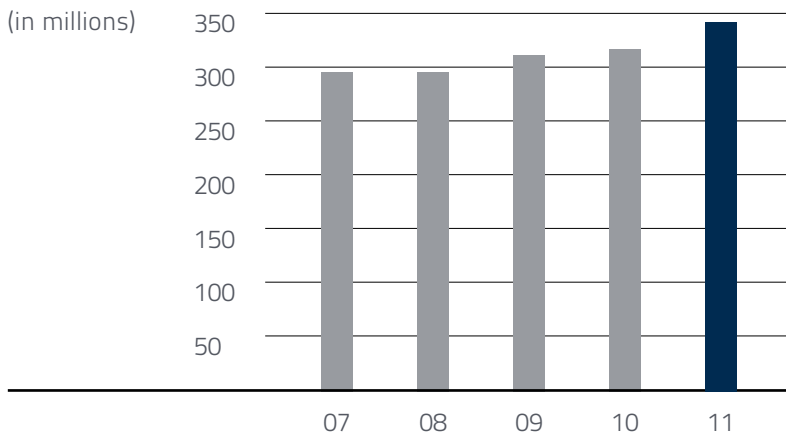
Association of Medical Directors of
Information Systems Award

FINANCIAL REPORT

SCHOOL OF MEDICINE TOTAL REVENUE

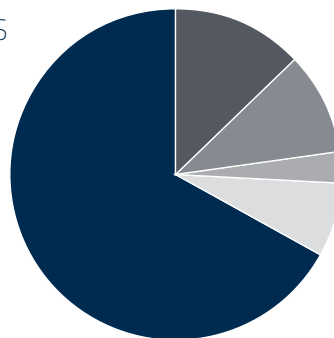


SCHOOL OF MEDICINE-SPONSORED RESEARCH AND TRAINING



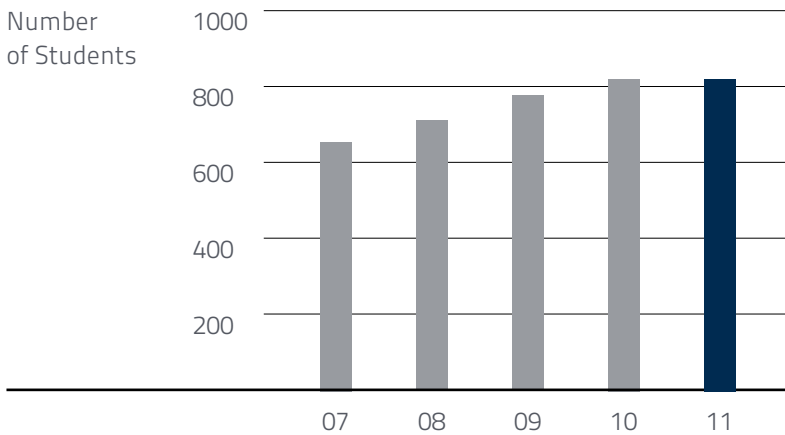
SCHOOL OF MEDICINE USES OF FUNDS

- 67% Research and Training Activities
- 13% Academic and Educational Activities
- 10% Facility Costs and Debt Service
- 3% School Administration
- 7% University Services



SCHOOL OF MEDICINE STATISTICS

ENROLLMENT



FALL 2011 ENROLLMENT

- 823 medical students, including:

- 85 in the MD/PhD program

- 460 in dual MD/master’s degree programs

- 164 in the Cleveland Clinic Lerner College of Medicine of Case Western Reserve

AFFILIATED HOSPITALS

- University Hospitals Case Medical Center (*primary*)

- Cleveland Clinic

- Louis Stokes Cleveland Department of Veterans Affairs Medical Center

- MetroHealth Medical Center

MEDICAL LICENSING

For the United States Medical Licensing Examination:

- Step 1: 98 percent pass rate

- Step 2 *Clinical Knowledge (CK)*: 96 percent pass rate

- Step 3 *Clinical Skills (CS)*: 98 percent pass rate

RANKINGS

In its annual “America’s Best Graduate Schools” special issue, ***U.S. News & World Report*** ranked Case Western Reserve School of Medicine 22nd in the country among research medical schools. Additionally, the following specialties were ranked among the best in the nation:

Biomedical Engineering	No. 11
Family Medicine	No. 12
Pediatrics	No. 14
HIV/AIDS	No. 16
Internal Medicine	No. 27

FACULTY

- 2,228 full-time

- 2,027 part-time

- 4,255 total faculty members

- 91 endowed professorships

PAMELA B. DAVIS, MD, PHD

Dean, School of Medicine, and Vice President for Medical Affairs,
Case Western Reserve University
Arline H. and Curtis F. Garvin, MD, Research Professor

LIZ LEAR

Senior Director, Marketing and Communications

JESSICA STUDENY

Assistant Director, Communications

CHIP VALLERIANO

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SCHOOL OF MEDICINE

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