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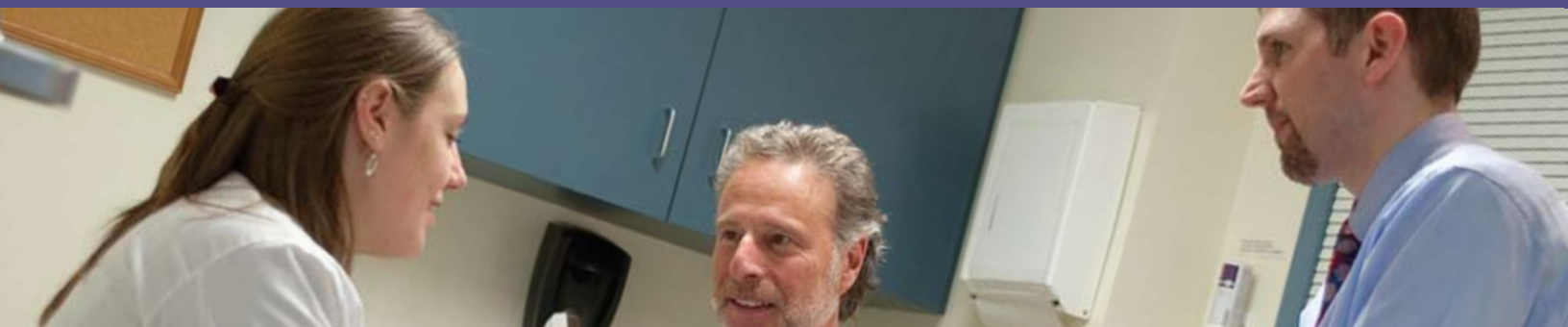
Unlikely Allies

# Vita<sup>a</sup>e:

The Magazine of  
The University of Massachusetts Medical School



Ready For Reform



A New Way of Teaching Medicine Begins

Vitae: L., the plural of life

The name of this magazine encompasses the lives of those who make up the University of Massachusetts Medical School community, for which it is published. They are students, faculty, staff, alumni, volunteers, benefactors and others who aspire to help this campus achieve national distinction in education, research and public service.

UMass Medical School’s mission is to advance the health and well-being of the people in the commonwealth and the world through pioneering advances in education, research and health care delivery. As you read about this dynamic community, you’ll frequently come across references to partners and programs of UMass Medical School (UMMS), the Commonwealth of Massachusetts’ only public medical school, educating physicians, scientists and advanced practice nurses to heal, discover, teach and care, compassionately.

Commonwealth Medicine

UMass Medical School’s innovative public service division that assists state agencies and health care organizations to enhance the value and quality of expenditures and improve access and delivery of care for at-risk and uninsured populations. [www.umassmed.edu/commed](http://www.umassmed.edu/commed)

The Research Enterprise

UMass Medical School’s world-class investigators, who make discoveries in basic science and clinical research and attract more than \$242 million in funding annually.

UMass Medical School/UMass Memorial Development Office

The charitable entity that supports the academic and research enterprises of UMass Medical School and the clinical initiatives of UMass Memorial Health Care by forming vital partnerships between contributors and health care professionals, educators and researchers. [www.umassmed.edu/foundation](http://www.umassmed.edu/foundation)

UMass Memorial Health Care

The clinical partner of UMass Medical School and the Central New England region’s top health care provider and employer. [www.umassmemorial.org](http://www.umassmemorial.org)



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This year’s School of Medicine entering class will experience a new curriculum that will help them to be lifelong learners



## Sloan-Kettering President Urges UMass Worcester Graduates to ‘Appreciate the Process of Flux’

The 37th Commencement exercises of the University of Massachusetts Worcester went off without a hitch on June 6, as 205 degrees were awarded under the big white tent that had dominated the campus green for the week.

Keynote speaker and honorary degree recipient Harold E. Varmus, MD, former head of the National Institutes of Health and president and CEO of Memorial Sloan-Kettering Cancer Center, likened this stage of the graduates’ lives to a biological or material phase shift, noting that “materials stay the same but, through pressure and temperature changes, they can take on new form and function.” He urged them to “appreciate the process of flux.”

Varmus received an honorary degree in recognition of his foundational contributions to biomedical research and his commitment to excellence in scientific inquiry and clinical care worldwide. Mary

C. DeFeudis, a longtime local philanthropist, received an honorary degree in recognition of her enthusiastic support for the academic health sciences center and her abiding love for her community and its residents. An honorary degree was also awarded to Michael Horgan, former chief executive officer and registrar of the Royal College of Surgeons in Ireland, for his considerable contributions to medical education and international educational partnerships.

The Graduate School of Nursing conferred 37 master of science degrees; four doctor of nursing practice degrees and two PhDs. The Graduate School of Biomedical Sciences conferred six master of science



Harold E. Varmus, MD, former head of the National Institutes of Health and president and CEO of Memorial Sloan-Kettering Cancer Center, was the keynote speaker at Commencement in June.

degrees in its new clinical investigation program, as well as 55 PhDs. And the School of Medicine awarded six MD/PhDs and 95 MDs.

For additional coverage of Commencement 2010, including videos, slide shows and interesting stories, visit [www.umassmed.edu/commencement](http://www.umassmed.edu/commencement).

## Second-Year Students Vow to Benefit Patients

Members of the School of Medicine’s Class of 2012 recited an oath they wrote themselves, vowing to uphold the principles of their profession as they prepare to embark on their clinical education. The second-year students stood before family, friends and faculty members at a special ceremony at Mechanics Hall in April, and pledged to “exemplify the skill, competence and character expected of physicians. And above all, we will honor this privilege and embrace this role with humility, integrity and reverence for life.”

“Through this ceremony then, we acknowledge publicly your profound responsibility to patients in the coming years, while also bearing witness to your declaration of commitment to the practice of medicine,” said Chancellor Michael F. Collins.



## School of Medicine Again Ranked Highly for Primary Care Education

UMass Medical School was ranked ninth in primary care education among the nation’s 131 accredited medical schools and 25 schools of osteopathic medicine by weekly news magazine *U.S. News & World Report* in its annual “America’s Best Graduate Schools” issue. UMMS, the lone school among the top 50 that accepts only in-state students to its medical degree program, has been listed near the top of the category since 1994 when the

magazine began publishing the rankings. *U.S. News* also ranked UMMS 47th among top research schools and 20th in family medicine among the specialty categories. “We take great pride in our role as educators and mentors, and we are especially proud of our faculty for making their commitment to quality in the educational setting apparent,” said Chancellor Michael F. Collins. “As the country prepares for the most

comprehensive reform of our national health care system in our history, UMass Medical School challenges students with a comprehensive, rigorous curriculum that will best prepare them to care for their patients while also reflecting our focus on excellence. This external validation of success in our key mission areas is notable.”



### Majority of Graduates Will Start Primary Care Residencies

Members of the School of Medicine Class of 2010 were accepted into some of the most competitive residency programs in the country, with 54 percent of graduates entering primary care (including obstetrics/gynecology). Fifty-seven students will be staying in Massachusetts for their residencies, including 18 who will start residencies at UMass Memorial Medical Center. At left, Meaghan Doherty, Caitlin Hurley and Diana Bradford celebrated during Match Day in March because they all matched at Brown University in pediatrics.

## Local Students Create Symbol of Power for the University

When Chancellor Michael F. Collins decided UMass Worcester needed its own mace, a traditional symbol of power carried with pride in ceremonies such as Commencement, he turned the project into a learning experience for students at Worcester Technical High School.

The result is an impressive four-foot-tall wood, Corian and metal creation that will play a central role in UMass Worcester’s significant events for years to come.

Under the guidance of machine technology teachers Michael Hurley and Brian Cummings, six Worcester Tech students spent four weeks designing, etching and milling the mace using mostly donated materials.

“The students were honored to work on this project,” said Hurley. “They not only did all of the craftsmanship that went into the construction, but they learned the history behind the mace, what it represents and how it was going to be used.”

In the past, the Medical School has borrowed the UMass Amherst mace for Commencement exercises.

The center piece of the mace has the University seal etched in brass and framed by mahogany-stained cedar as a focal point. Below the seal, and offset by Corian disks, is a brass hexagon engraved on three sides with the names of the three UMass Worcester schools—School of Medicine, Graduate School of Biomedical Sciences and Graduate School of Nursing—all of which sits atop a cedar staff and is topped with a brass finial.





## Blue Light Focuses Attention on Autism Awareness Day



Partnering with Autism Speaks, the world's largest autism science and advocacy organization, UMass Medical School splashed its façade with the Autism Speaks puzzle-piece logo in bright blue and white lights on the night of April 2. The event was part of "Light It Up Blue," a global effort to heighten awareness of autism, a complex neurobiological disorder that now affects an estimated 1 in 110 children in the United States.

Landmark buildings around the world were bathed in blue light for the third annual World Autism Awareness Day, established in 2007 by a resolution passed unanimously by the United Nations General Assembly.

"Our participation in Light It Up Blue is a tangible way for us to highlight our efforts in raising awareness about autism in our community," said Jean A. Frazier, MD, the *Robert M. and Shirley S. Siff Chair in Autism* and professor of psychiatry and pediatrics. "It symbolizes our dedication to serving individuals with autism and their families through our clinical care, training and education efforts, advocacy and research." 🗨️

## Walk to Cure Cancer Set for Sept. 26

Plans are well underway for the 12th annual Walk to Cure Cancer that will take place on Sunday, Sept. 26, beginning at noon on the UMass Medical School campus green.

The five-mile Walk to Cure Cancer is the largest, single-day fundraising event in Central Massachusetts. The event supports innovations in cancer research and treatment at UMass Medical School and the UMass Memorial Cancer Center of Excellence. To date, the Walk has raised more than \$6 million for cancer research, equipment, facilities and world-renowned medical professionals. The goal for this year's Walk is 15,000 participants raising \$1 million.



Michael R. Green, MD, PhD

UMass Medical School researchers may have uncovered a way to keep the deadly brain cancer malignant glioma from spreading. As reported in the journal *Nature Medicine*, Michael R. Green, MD, PhD, professor of molecular medicine and biochemistry & molecular pharmacology, and colleagues have identified a cellular pathway essential to the cancer's ability to

## RNAi Screening Tool Uncovers Potential Way to Keep Brain Cancer From Spreading

grow—and a potential target for therapy. In the paper "A genome-wide RNA interference screen reveals an essential CREB3L2-ATF5-MCL1 survival pathway in malignant glioma with therapeutic implications," Dr. Green, who is a Howard Hughes Medical Institute Investigator and the *Lambi and Sarah Adams Chair in Genetic Research*, and colleagues report on using a screening tool to identify a dozen genes that affect the function of a crucial protein necessary for glioma cells to grow; further research found a key pathway that appears in laboratory cultures and animal models to be susceptible to two cancer drugs already in use for other types of cancer.

A hallmark of cancer is uncontrolled cell growth, often caused by overexpression of genes that help cells survive, or under-expression of those genes that induce cell death. Genes that are expressed highly in

cancer cells and are essential for their survival are appealing targets for drug therapy.

Green's lab has in recent years developed an innovative way of scanning the genome to identify genes that appear to promote the natural process of programmed cell death called "apoptosis," or that inhibit the growth of cells. Green and colleagues used a technique called genome-wide RNA interference screening to identify novel genes that regulate the expression of a transcription factor called ATF5 in malignant glioma cells. The discovery of at least one previously unknown genetic pathway that appears to regulate this key transcription factor, and the subsequent determination that the cancer drugs sorafenib and temozolomide inhibit glioma growth, point to dramatic new possibilities for potential therapeutics and are exciting advances at the frontier of cancer biology and genetic expression. 🗨️

## Albert Sherman Center Update: Can You Dig It?



Following the ceremonial groundbreaking for the Albert Sherman Center during Convocation last fall, shovels hit the ground for real this April as construction of the nine-story, 480,000-square-foot building began in earnest.

In early April, the area was fenced off and heavy equipment rolled onto the site. The northern stretch of First Road was taken

over, and the Basic and West parking lots were eliminated to make way for construction.

The first phase of construction, which will extend into the fall, involves excavation and grading for the foundation, and installation of the various utility lines needed to support building. Blasting to remove nearly 20,000 cubic yards of rock

from the site began in June. If all goes well, steel will begin to rise from the foundation in late fall.

The \$400-million building project is scheduled to open in 2012 and will house educational space as well as the Advanced Therapeutics Cluster, which will house more than 100 investigators working to develop innovative therapies for a range of human diseases.

For more information about the project, and to see construction progress in real time via Web cams that cover the site, visit: [www.umassmed.edu/shermancenter](http://www.umassmed.edu/shermancenter).

Blasting is continuing at the Albert Sherman Center construction site as nearly 20,000 cubic yards of rock are removed.

  
The Albert Sherman Center  
AT UMASS MEDICAL SCHOOL

*\*The Life Sciences Evolution is Here*





Terence R. Flotte, MD, dean of the School of Medicine and provost and executive deputy chancellor of UMass Medical School, professor of pediatrics and an internationally known pioneer in human gene therapy, was

## Association of American Physicians Elects Flotte

Terence R. Flotte, MD, dean of the School of Medicine and provost and executive deputy chancellor of UMass Medical School, professor of

elects into the Association of American Physicians (AAP), a prominent organization founded in 1885 for the advancement of scientific and practical medicine.

“This honor recognizes the impact that Terry’s research has had in advancing health care internationally,” noted Robert W. Finberg, MD, chair of the department of medicine. “Most importantly, as the

consummate clinician and scientist, Terry, through his leadership, has helped propel UMass Medical School to the forefront of medical research, while he has worked tirelessly to advance health care in central Massachusetts. In doing so, he has provided all of us in the Medical School with an ideal role model and energetic advocate for better health care.”



Phillip D. Zamore, PhD

UMass Medical School received a patent for a technique that uses naturally occurring microRNA as a template for engineered RNA that can

## UMMS Receives Patent for microRNA Research



Craig C. Mello, PhD

selectively change the expression of a targeted gene. This method has found broad application as a tool for gene discovery and analysis in basic research and drug discovery.

The patent, “In Vivo Production of Small Interfering RNAs That Mediate Gene Silencing,” is based on research performed by co-inventors Phillip D. Zamore, PhD, Howard Hughes Medical Institute Investigator and the *Gretchen Stone Cook Professor of Biomedical*

*Sciences*; Craig C. Mello, PhD, Howard Hughes Medical Institute Investigator, the *Blais University Chair in Molecular Medicine* and 2006 Nobel Laureate; Juanita McLachlan and Gyorgy Hutvagner, members of the Zamore lab; and Alla Grishok of the Mello lab.

The patent claims cover a powerful technique drawing on a fundamental mechanism in basic biology: using naturally occurring, endogenous microRNA (miRNA) precursors as templates for designing siRNAs to selectively modulate expression of a target gene.



Guido Majno, MD

“Dr. Majno will always be remembered here as a colleague of the first order.”

—Michael F. Collins, Chancellor

## Medical School Mourns Loss of Former Pathology Chair, Guido Majno

Guido Majno, MD, who served as chair of the Department of Pathology at UMass Medical School from 1973 to 1995, died on May 27. When Dr. Majno joined the Medical School in its infancy, he was already a renowned scientist, educator and perhaps most lastingly, a Renaissance man and a humanist. It was for this quality that he was recognized in 1999 by the Association of American Medical Colleges with its Humanism in Medicine Award.

“In addition to creating a Department of Pathology that stressed in equal and important measure medical education and scientific inquiry, Dr. Majno will always be remembered here as a colleague of the first order,” said Chancellor Michael F. Collins.

The many awards and recognitions he received from students, faculty and professional societies all share a common thread of linking the life of the mind with the humanity of the healer. He was the father of two great works: *Cells, Tissues and Disease*, still in print from Oxford University Press and written with his

wife, friend and collaborator, Isabelle Joris, MD; and *The Healing Hand: Man and Wound in the Ancient World*.

“To his many friends, colleagues, collaborators, and perhaps most of all, to the hundreds of medical students who learned from him, we share their sorrow and offer our deep condolences,” said School of Medicine Dean Terence R. Flotte, MD, provost and executive deputy chancellor.

One reviewer of *The Healing Hand* captured Majno perfectly, calling him “a great laughing, learned, extroverted giant, dragging you with him on a stimulating and entertaining journey.”

## Two More Faculty Join Executive Leadership Program



Katherine F. Ruiz de Luzuriaga, MD



Julia D. Andrieni, MD

Two faculty members of the UMass Medical School have been named fellows of the Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) Program for Women at the Drexel University College of Medicine in Philadelphia.

Julia D. Andrieni, MD, associate professor and vice chair of the department of medicine and chief of the division of general internal medicine; and Katherine F. Ruiz de Luzuriaga, MD, professor of medicine and pediatrics, chief of the division of pediatric immunology, infectious diseases and rheumatology, and associate provost for Global Health, will engage in the year-long experience featuring extensive networking and mentoring opportunities.



Kristen Etensohn, third from left, with fellow Class of 2010 classmates Emily Marsters, Lydia Helliwell and Jhila Biswas during a 2007 medical mission trip to Peru.

Kristen Etensohn, 27, a member of the School of Medicine’s Class of 2010, died on July 11 after a two-year battle with cancer. Members of the class had voted

## School of Medicine Student Loses Battle With Cancer

her honorary class marshal at the 2010 Commencement.

In high school, Etensohn distinguished herself in academics, athletics and service. A top scholar, she was also captain of her cross country and track teams, and set several of her school’s running records. She received her undergraduate degree in biogenetics in 2005 from Dartmouth College, where she also ran varsity track and cross country. She was a contributor and editor of the *Dartmouth Journal of Undergraduate Science*.

Prior to entering the UMass Medical School in 2006, she performed research at the National Institutes of Health and Woods Hole Oceanographic Institute. At UMMS, she participated in medical missions to both Peru and the Dominican Republic, and was the representative to the Massachusetts Medical Society Student Association.

She is survived by her parents David Etensohn, MD, and Linda Hassan Etensohn, MD; her brother, Derek; and her fiancé, Paul W. Ryan Jr.



## UMMS Donates Life-Saving Vaccine to Haiti



UMass Medical School donated 500,000 doses of tetanus/diphtheria vaccine (Td) to help earthquake victims in Haiti. Chancellor Michael F. Collins announced the donation at the opening of a new research and development facility at the Medical School's MassBiologics laboratories, which makes the Td vaccine and other medicines.

"In the immediate aftermath of the Haiti earthquake, a call for help came and it was quickly answered by a team from our Medical School, including Provost and Dean Terry Flotte, and colleagues from UMass Memorial Health Care, our clinical partner," Chancellor Collins said. "Dr. Flotte and other team members cared for more than 1,000 patients in Haiti's capital. In makeshift settings, they treated the young and the old who were afflicted with a variety of health ailments and they identified an incredible unmet need for Tetanus vaccine. It was in short supply then and there continues to be a serious lack of this vital therapeutic."

Because of widespread vaccination in the United States, diphtheria and tetanus are not major health threats here. In Haiti, however, many people are not fully immunized and the infections remain a serious and often deadly condition,

particularly among children. The bacteria that cause tetanus and diphtheria often live in dirt, rubble and rust, so the chance of exposure in an earthquake-ravaged zone is high. And since many Haitians have not been previously vaccinated against the bacteria, tetanus and diphtheria are significant threats.

Upon his return from Haiti, Dr. Flotte and Donna Ambrosino, MD, executive director of MassBiologics, began working on a plan to get Td vaccine to the people in Haiti who needed it.

"Recognizing our unique position to help, Dr. Ambrosino and her colleagues mobilized MassBiologics to act," Collins said. "Within the FDA-controlled warehouse of this campus are nearly 500,000 doses of the Td vaccine. Today, we are officially setting those aside for the people of Haiti."

MassBiologics is the only non-profit, FDA-licensed manufacturer of vaccines and other biologic products in the United States. It produces nearly 30 percent of the country's Td vaccine, supplying the vaccine to Massachusetts residents at no charge and distributing the balance commercially across the United States. ●

## MassBiologics Opens \$70-Million Research Center

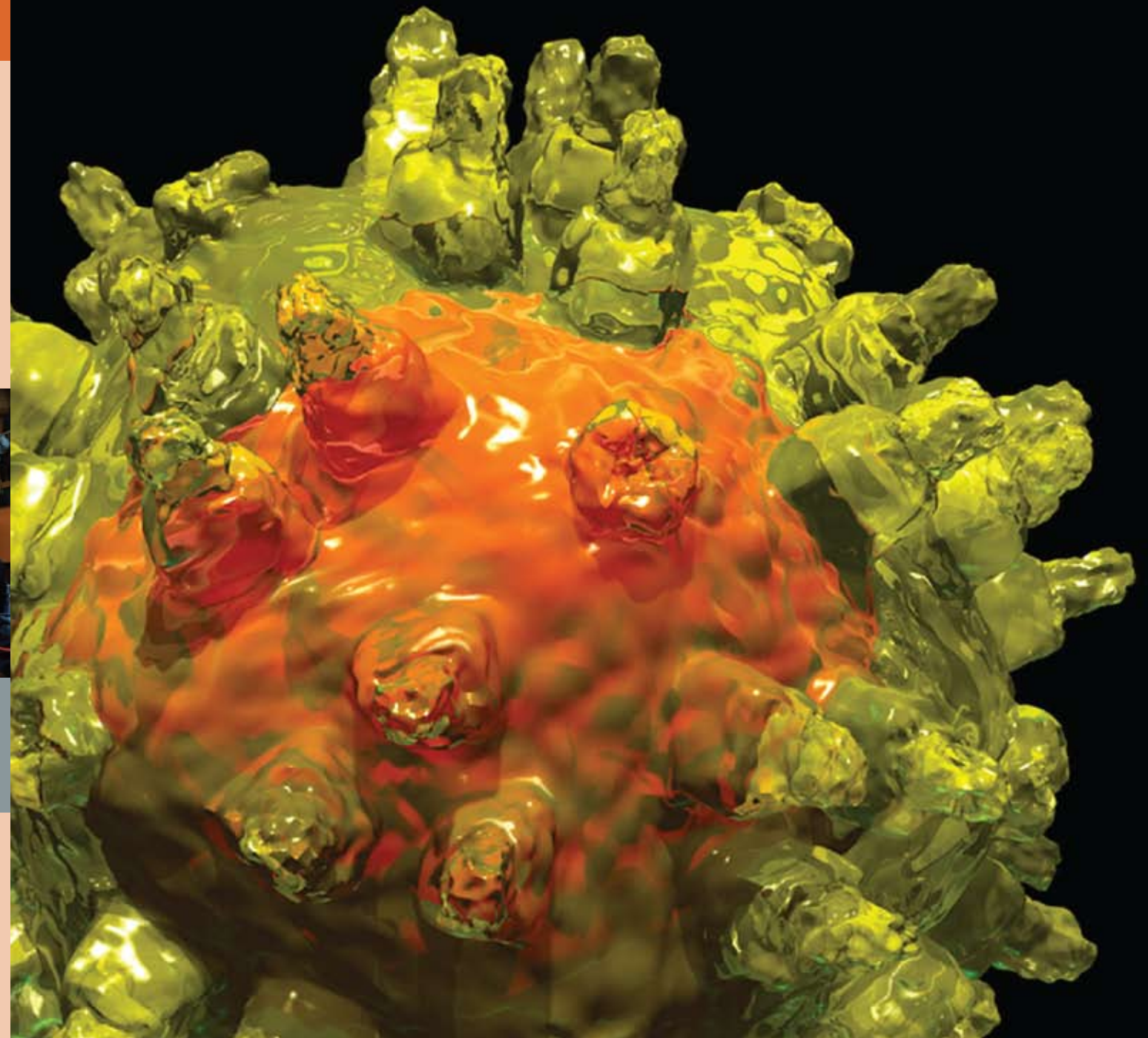
Launching the next phase of its century-old mission of protecting public health, MassBiologics at the University of Massachusetts Medical School opened a new \$70-million research center on its Mattapan campus in Boston.



At the ribbon cutting for MassBiologics' new \$70-million research center in Mattapan: From left, Boston City Councilor Charles Yancy; Chancellor Michael F. Collins; Donna Ambrosino, MD, director of MassBiologics; and State Rep. Willie Mae Allen.

The 90,000-square-foot facility will centralize MassBiologics' research and development team into state-of-the-art laboratories designed to foster collaboration and speed the pace of discovery.

"This is the beginning of a new era in research and discovery for MassBiologics," said Donna Ambrosino, MD, executive director of MassBiologics and a professor of pediatrics at the Medical School. "This new facility will allow us to enhance and expand our research and bring new products to the public to address important, unmet medical needs."



## Unlikely Allies

*UMMS gene therapy researchers study ways to deliver normal functioning genes using viruses*

By James R. Fessenden

Computer-generated artwork represents the adeno-associated virus.



**Looking at Fred Walsh in repose, you wouldn't guess that he suffers from a genetic disorder that makes it difficult to breathe.** Follow him up a flight of stairs or watch him on the treadmill, however, and you can see how he struggles and gasps for each successive breath. Walsh is one of the 100,000 people in the United States suffering from alpha-1 antitrypsin deficiency, an underdiagnosed condition that is passed down through families and can lead to fatal lung and liver complications.

“When I first started showing symptoms, it was originally diagnosed as allergic asthma,” said Walsh. “It wasn’t until five years later, when I happened to be changing physicians, that I was tested for alpha-1 antitrypsin deficiency.” Walsh, who is the Massachusetts coordinator for AlphaNet, a nonprofit group providing support services and a disease management program for individuals with alpha-1, said because of varying symptoms and exposure to environmental risks, patients often are not accurately diagnosed with alpha-1 antitrypsin deficiency for three to five years after seeking treatment.

Ironically, Walsh’s lungs are being destroyed by an enzyme that is supposed to help protect them. Alpha-1 antitrypsin controls a naturally occurring enzyme that helps the lungs fight off infections and toxins, such as cigarette smoke. Patients with the alpha-1 mutation don’t produce enough protein to turn off the infection-fighting enzyme, leaving it to slowly destroy lung tissue even after an infection has been eradicated. Over time, the loss of healthy lung tissue can lead to respiratory difficulty

and lung disease, with emphysema developing as early as 40 for some patients.

Because the alpha-1 gene mutation can come in several forms and is passed down from each parent, patients with the deficiency can produce varying levels of the alpha-1 protein. Patients with severe deficiency, also known as ZZ, receive weekly infusions of the protein derived from human plasma, called augmentation therapy, to increase protein concentrations in the blood and lungs and stave off progression of the disease. The injections, however, are costly and must continue throughout a patient’s life.

For Walsh and others suffering from this disorder, new clinical research drawing upon the promise of an adeno-associated virus (AAV) vector to safely deliver a normal functioning gene to cells may provide a safer, more effective and longer-term treatment than weekly infusions. Terence R. Flotte, MD, dean of the School of Medicine and provost & executive deputy chancellor

of UMass Medical School, is conducting the first phase II clinical trial to test the safety and effectiveness of using an AAV vector to replace the faulty gene that prevents the production of the alpha-1 antitrypsin protein.

Previous clinical trials by Dr. Flotte, who is also professor of pediatrics and a practicing pediatrician, have shown that patients who have had functional alpha-1 genes injected into muscle tissue using an AAV vector are capable of producing the alpha-1 protein. “When delivered into the muscle, those cells become a factory, supplying a sustained release of the healthy protein these individuals are missing,” said Flotte. The current trial seeks to establish that a near-therapeutic level—in this case a 50-fold increase over the last trial—of the alpha-1 protein can be produced by the transferred genes after being injected into cells. If successful, further trials will test the safety and efficacy of delivering a therapeutic level of the gene.

As part of the UMMS study, three cohorts of three patients each will receive increasing amounts of the alpha-1 carrying gene vector in single and multiple injection sites. Over the next 12 months, Flotte and his team will monitor patients for potential adverse effects as a result of the injections, as well as for the hoped-for result of increased concentrations of the alpha-1 protein in the blood serum.

One of the dangers of delivering a gene into a cell using a virus is that it could activate the body’s immune system, causing it to attack healthy cells harboring the virus-delivered gene. In a 1999 clinical trial, the vector used to deliver a gene to a patient resulted in a severe immune response leading to the patient’s death. In other cases, genes can end up in the wrong area of the genome or in the wrong cells—in these cases, the virus essentially deposits its DNA into a random part of the genome creating unintended consequences that are passed along as the host cell divides. This is believed to have caused leukemia in three patients enrolled in a 2003 French gene therapy trial.

AAV has several benefits over other viral vectors used in previous clinical trials. First, and perhaps most importantly, it is a non-disease causing, non-replicating virus. While other virus vectors can retain as much as 80 percent of the virus genes, AAV-based vectors are totally gutted by design and retain no viral genes. “The AAV vector has not been associated with any human disease,” said Guangping Gao, PhD, professor of molecular genetics & microbiology. An internationally recognized leader in adeno-associated virus research, Dr. Gao joined UMass Medical School in 2008 as the founding director of the Gene Therapy Center. “In fact, roughly 20 percent of human cells already contain the adeno-associated virus.”

Another benefit of using AAV vectors for delivery of DNA, as opposed to other virus vectors, is that it doesn’t integrate its DNA into the host cell’s genome. With other integrating viruses, it’s possible that the random insertion of foreign DNA into the cell could cause a tumor or a malfunction leading to other complications. AAV, however, is able to deploy its genetic payload into the cell without integrating into the host cell’s genome, making it a safer alternative.

Even with these advantages, researchers are proceeding cautiously, making sure that the vector is safe for patients before proceeding to the next incremental step in the clinical trial process. Still, AAV vectors have shown tremendous initial promise in early clinical trials, having been safely delivered into

Fred Walsh, the Massachusetts coordinator for AlphaNet, a nonprofit group providing support services and a disease management program for people with alpha-1 antitrypsin deficiency, hopes work being done by the Gene Therapy Center will help treat the disease.

“The Holy Grail for people with alpha-1 antitrypsin deficiency is to have a gene fix at the source. Research being done by Dr. Flotte and his colleagues at the Gene Therapy Center at UMass Medical School is bringing us one step closer to that goal.”

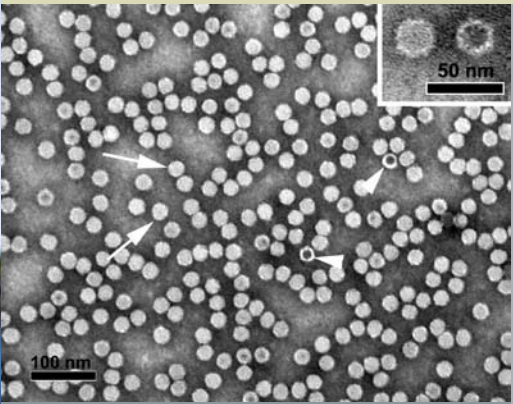
—Fred Walsh



### Clinical promise of AAV

Flotte’s gene therapy trial for alpha-1 antitrypsin deficiency is just one example of how UMass Medical School researchers are applying the adeno-associated virus vector to further clinical, pre-clinical and basic research. Established as part of the Advanced Therapeutics Cluster and slated to move into the \$400-million, 480,000-square-foot Sherman Center when it opens 2012, the Gene Therapy Center is focused on realizing the promise that lies in the application of AAV vectors.

Over the last two decades, the use of viruses as a vector to deliver gene therapies to patients has come under scrutiny.



AAV is a non-disease causing, non-replicating virus that can deliver therapeutic genes into targeted cells.

“This is part of the power of AAV vectors. You can use them to deliver a variety of genetic material—DNA, RNA, microRNA—that can all be loaded into an AVV vector and delivered into a biological model.”

—Neil Aronin, MD



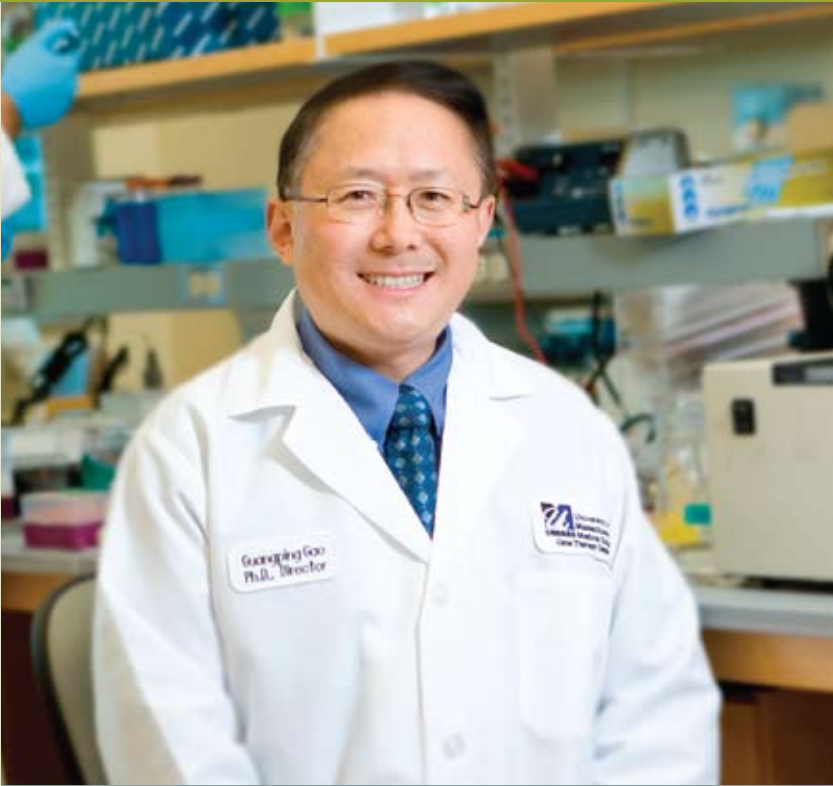
eye and muscle cells. One of the these early trials, conducted by Flotte and published in the *Proceedings of the National Academy of Science* last fall, is the basis for the current phase II alpha-1 trial being conducted at UMMS. Additionally, Shalesh Kaushal, MD, PhD, chair and associate professor of ophthalmology and cell biology, is conducting clinical trials exploring the safety and effectiveness of using an AAV vector to deliver genetic material to treat type-2 Leber Congenital Amaurosis (LCA), a rare and inherited eye disease that causes severe visual loss within the first few months of life, and wet macular degeneration, an age-related retinal disease leading to vision loss.

### Controlling AAV and gene expression

To further refine and expand the application of AAV vectors, researchers at UMass Medical School are exploring ways to get the viral vector to the exact targeted cell, and how to turn the genetic cargo on and off. “One of the advantages UMass Medical School has in this area is that we understand the biology of the virus so well,” Gao said. “We know how the virus gets into different cells, the various pathways it uses, and how it arrives in different places and expresses genes differently. The better we understand the biology of the vector, the more likely we’ll be able to safely use it in clinical applications.”

Groups of viruses can be classified by their serotypes—the coating found on the surface of the virus that determines which type of cell they can, and will, enter. Central to controlling the distribution of the AAV is identifying safe, efficient and effective serotypes that will allow the vector to deliver the therapeutic gene to the correct cell. In 2005, Gao identified more than 100 new serotypes, many of which may be useful as novel vectors for potential gene therapy treatments. Currently, he is investigating the use of several of these serotypes to deliver genetic materials to tissue in the brain and spinal cord. Discovery of a safe and efficient vector targeting the brain could be the first step in Gao’s investigations into a treatment for Canavan disease, a genetic disorder that causes progressive damage to nerve cells in the brain. He estimates that if the correct AAV serotype is used, a majority of cells will be targeted by the vector.

As a further refinement, and added safety measure for that small percentage of genetic material that may be delivered to an unintended cell type, Gao is using microRNA—small RNA molecules involved in turning genes on and off—to keep these genes from becoming active in unintended places. “We want to ensure that the genetic material that’s being delivered only gets expressed in the targeted cell types,” he said.



Guangping Gao, PhD, director of the Gene Therapy Center

“One of the advantages UMass Medical School has in this area is that we understand the biology of the virus so well . . . The better we understand the biology of the vector, the more likely we’ll be able to safely use it in clinical applications.”

—Guangping Gao, PhD

Collaborating with Phillip D. Zamore, PhD, Howard Hughes Medical Institute Investigator, *the Gretchen Stone Cook Chair of Biomedical Sciences* and professor of biochemistry & molecular pharmacology, Gao has been attaching pieces of “receptor” sequences for microRNA associated with unintended tissue types in an attempt to suppress expression of the delivered gene in those tissues. The goal is to use cell-specific microRNA to prevent the genetic material from turning on in other tissue types. “For instance,” said Dr. Zamore, also one of three co-directors of the RNA Therapeutics Institute, “if you want to

target the stratum but not the cortex of the brain, you can select a microRNA for the cortex. This allows the gene to be expressed in the stratum but not the cortex.”

### AAV in the lab

Though AAV holds tremendous promise for researchers studying single-gene disorders, establishment of the Gene Therapy Center has been a boon for other researchers at UMMS as well. The AAV vector is being widely used in preclinical studies as a proof of concept for turning genes on and off, as well as in basic research where gene functions are still not understood.

In collaboration with Miguel Sena-Esteves, PhD, associate professor of neurology and a member of the Gene Therapy Center, Neil Aronin, MD, professor of medicine, cell biology and physiology, is using AAV vectors on two fronts. In his research into Huntington’s disease, a progressive neurodegenerative genetic disorder, Aronin is using the viral vector to deliver small RNA molecules that could potentially knock down the mutant Huntington’s gene.

Because the Huntington’s gene is necessary for survival, one of the chief hurdles in tackling the disorder is the need to knock down the mutant, disease-causing gene without harming the normal gene. To that end, Aronin is using AAV vectors as the delivery vehicle to explore whether chromosome-specific, small RNA molecules can be used to turn off the mutant Huntington’s gene while leaving the normal functioning gene—on the other chromosome—unaffected.

“This is part of the power of AAV vectors,” said Aronin. “You can use them to deliver a variety of genetic material—DNA, RNA, microRNA—that can all be loaded into an AAV vector and delivered into a biological model.”

In addition to using AAV vectors in the lab as a proof-of-concept tool for knocking down genes, Aronin is using it to accelerate his research of Huntington’s disease. Under normal conditions, it takes months to develop an animal model with Huntington’s disease. Using an AAV vector loaded with the mutant Huntington’s gene, an animal model with Huntington’s disease can be developed in roughly two weeks. Results published in the *Proceedings of the National Academy of Science* in 2007 showed that AAV could successfully deliver mutant Huntington genes to animal models.

“Having the Gene Therapy Center at UMass Medical School puts the institution on another level,” said Aronin. “One of the strengths of Dr. Flotte’s vision is his understanding of how having true expertise in the delivery of genes can support research on campus as a whole. The Gene Therapy Center

addresses what was a gap in knowledge and expertise.”

In a similar way, AAV vectors provide a critical tool for understanding basic gene function for those scientists exploring fundamental questions about biology and molecular medicine, said Gao. There is still a mountain of biological and genetic processes that aren’t understood. Researchers simply asking questions about a piece of DNA or RNA can use an AAV vector to either knock down or over-express a gene or a microRNA and observe the results.

Among the three centers of the Advanced Therapeutics Center—the Gene Therapy Center, RNA Therapeutics Institute and the Center for Stem Cell Biology and Regenerative Medicine—there is interconnectivity in the way researchers work together in investigating cutting-edge therapies. Whether it’s using AAV vectors to bring potentially new gene treatments to patients with alpha-1 antitrypsin deficiency or explore new therapeutic targets for Huntington’s disease or simply to answer a biological question nobody has asked before, there is a strong sense of collaboration among researchers at UMMS. Looking toward to a shared future in the Sherman Center, researchers at the various centers believe that the collaborative bonds among them will only be strengthened.

“Good collaboration is about more than principal investigators exchanging ideas and insights,” said Zamore. “It’s when you have everybody in the lab, postdocs and students, talking about their work, thinking together and challenging ideas. They put mutual pressure on each other to perform at a high standard, and that can’t be sustained over a distance. Sharing the same space will only facilitate those conversations and further enhance the collaborative environment at UMMS.”

Ultimately, the hope is that AAV vectors will provide a vehicle for the safe, efficient and long-term treatment of certain genetic disorders such as alpha-1 antitrypsin deficiency. “The Holy Grail for people with alpha-1 antitrypsin deficiency is to have a gene fix at the source,” said Walsh. “We think that’s possible and that gene therapy is going to be part of the process. Research being done by Dr. Flotte and his colleagues at the Gene Therapy Center at UMass Medical School is bringing us one step closer to that goal.” 🍀





Jay Lawrence and Stephanie Galica Lawrence

# Ready for Reform

*UMMS well positioned as health care reform takes root*

By Sandra L. Gray

The same month President Obama signed a historic health care reform bill into law, then fourth-year School of Medicine students Jay Lawrence and Stephanie Galica Lawrence were overjoyed to learn that they had received their first choice matches for their primary care medicine/pediatrics residencies at UMass Memorial Health Care. Rather than being nervous about starting their careers not knowing what the law might bring, they are excited to be in the vanguard of health care reform.

“Having chosen UMass Medical School for its emphasis on primary care, and being here in Massachusetts where health care reform was first legislated, we were already steeped in it,” said Jay Lawrence. “With the advent of national reform coinciding with our next four years of training, we have the good fortune to be able to see the law implemented at the same time we are preparing to become independent practitioners.”

After meeting as first-year students, the now-married couple discovered common interests in health care access, quality and affordability as they became better acquainted during a community medicine interclerkship addressing health policy, and an international medical education experience in the Dominican Republic.

Stephanie Lawrence’s earliest inspiration was her father,

Michael Galica, MD, a UMass Memorial Medical Group internist and assistant professor of medicine at UMass Medical School. “I’ve always wanted to work in primary care for underserved populations,” she said. “I am hopeful that health care reform will support my goals as I support it.”

Like its graduates, UMass Medical School is well-positioned to build around the three pillars of the national health care reform law: universal access, consistent high quality and sustainable affordability. While it will take time to sort through the myriad implications and opportunities created by the law, UMMS is already digging into the work that promises to turn the vision of reform into reality, drawing upon the Medical School’s vast expertise and foundational commitment to serve the greatest public good.

## Embracing health care reform

Embracing the values that form the foundation of health care reform is neither new to the Medical School nor unique to its newest doctors: The School of Medicine was founded with its focus on primary care, one of the drivers of reform. Having enriched and expanded the health care workforce with advanced practice nurses and nurse educators for more than two decades, the Graduate School of Nursing is always focused on how nurses can improve health care access and quality. And Commonwealth Medicine, the Medical School’s health consulting division, has for many years been working behind the scenes with state and federal health care agencies to expand access and control costs while optimizing health care outcomes in the public health sector.

*“We are several years ahead of the curve”*

Daniel Lasser, MD, MPH

With at least 30 million more Americans entering the health care system due to national health care reform, primary care providers—already in short supply—will be needed more than ever. Daniel Lasser, MD, MPH, chair and professor of family medicine & community health, is proud that UMass Medical School is consistently ranked in the top of the nation’s medical schools for primary care education. With data supporting the theory that an emphasis on primary care results in better quality care, “We are several years ahead of the curve,” he said.

In the School of Medicine, a focus on primary care begins in the classroom and continues into clinical practice, with curricula covering primary care quality and patient safety for medical students, residents and attending physicians. “The advantage of being an academic medical center is that we can get grants to develop and test new methods,” said Dr. Lasser of curriculum development and other health care reform-related projects.

He cites just a few of the strategies that are already being collaboratively used by the Center for the Advancement of Primary Care (CAPC), a joint initiative of UMass Medical School and clinical partner UMass Memorial Health Care. Much of CAPC’s activity relates to the patient-centered medical home, a model in which a primary care physician coordinates all aspects of a patient’s preventive, acute and chronic care. A patient-centered medical home features an ongoing relationship between a provider and patient, around-the-clock access to medical consultation, respect for a patient’s cultural and religious beliefs, and a comprehensive approach to care and coordination of care through providers and community services.

“The patient-centered medical home is at the forefront of where primary care needs to go and is going, and is an essential element of health care reform,” said Judith Steinberg, MD, MPH, clinical associate professor of medicine and family medicine & community health, who also serves as deputy chief medical officer for Commonwealth Medicine and senior director of clinical affairs for its Center for Health Policy and Research (CHPR). “It is exciting that collaborations within the Medical School are playing a prominent role in expanding and spreading the medical-home knowledge base to transform primary care practice and health care delivery,” she said.

Lasser also points to a key financial incentive that can help steer new doctors into primary care as opposed to a specialty such as cardiology where they can earn two or three times more than a primary care doctor. UMass Medical School’s longstanding Learning Contract forgives two-thirds of tuition in return for practicing primary care anywhere in the state, or any specialty in an underserved area in the state.

Health care information technology (HIT), comprising electronic medical records and more, has also long been a focus of CAPC and CHPR. “Beyond the medical record, HIT has the potential to both streamline and improve health care delivery,” Lasser noted. “For example, the ability for patients to access information about their conditions from their physician’s Web site, or to make appointments online, frees up office staff for more proactive tasks like telephoning patients to follow up on their treatment.”

*“Nurses will play a major role in health care reform.”*

Paulette Seymour-Route, PhD

Like the School of Medicine, the Graduate School of Nursing is developing health care leaders and innovators who will be front and center in the projected transformation of health care delivery. Advanced practice nurses are in an ideal position to provide primary, transitional and preventive health care in addition to the acute care provided within the hospital setting. “The law has multiple programs and provisions directly related to nursing,” noted Paulette Seymour-Route, PhD, dean of the GSN and professor of nursing. Opportunities include grants for nursing schools to strengthen and expand educational programs, student loan programs, nurse faculty loan programs and funding to support nurse-managed health clinics—all of which can contribute to expanding access for patients.

Dr. Seymour-Route highlighted a major area where the GSN can immediately contribute to successful health care reform: addressing the shortage of both nurse practitioners and nurse educators. The Doctor of Nursing Practice (DNP) program



develops further opportunities for nurses as both leaders and members of inter-professional care teams to improve the quality, safety and outcomes for patients.

“The goal of the DNP, like that of health care reform, is to improve care and outcomes,” said Kathleen H. Miller, EdD, RN, professor of nursing, associate dean for advanced practice programs and director of the DNP program, which was introduced in 2008 to prepare advanced practice nurses for leadership roles in clinical practice. In particular, the DNP leadership track, new this year, integrates into its coursework all the policy implications of the law, formally known as the Patient Protection and Affordable Care Act (PPACA).

“One of a chief nursing officer’s most important roles in health care reform is the stewardship of quality and safety for our patients,” noted Seymour-Route, herself previously chief nursing officer at UMass Memorial Medical Center. “The DNP prepares future nurse leaders to take on these challenges with a sound and contemporary foundation, including coursework in areas such as health policy, informatics, systems and evidence-based practice.” Additionally, the GSN addresses the need for qualified academic and clinical faculty through both doctoral and master’s programs. The PhD program, DNP program and the Nurse Educator master’s program develop highly qualified faculty who educate students across the professional continuum.

*“CWM has a long-standing relationship with the state to develop and test health care improvements.”*

Jean Sullivan, JD

Upon passage of health care reform, Commonwealth Medicine’s Center for Health Law and Economics (CHLE) issued two reports. One itemizes more than 100 pilot programs, demonstration projects and grant opportunities in the law, which also authorizes more than \$22 billion for these efforts. “This is one of the few federal laws that makes a significant investment in building the evidence base for what does and doesn’t work in health care,” said Jean Sullivan, JD, director of CHLE. “As a research institution, we can help.”

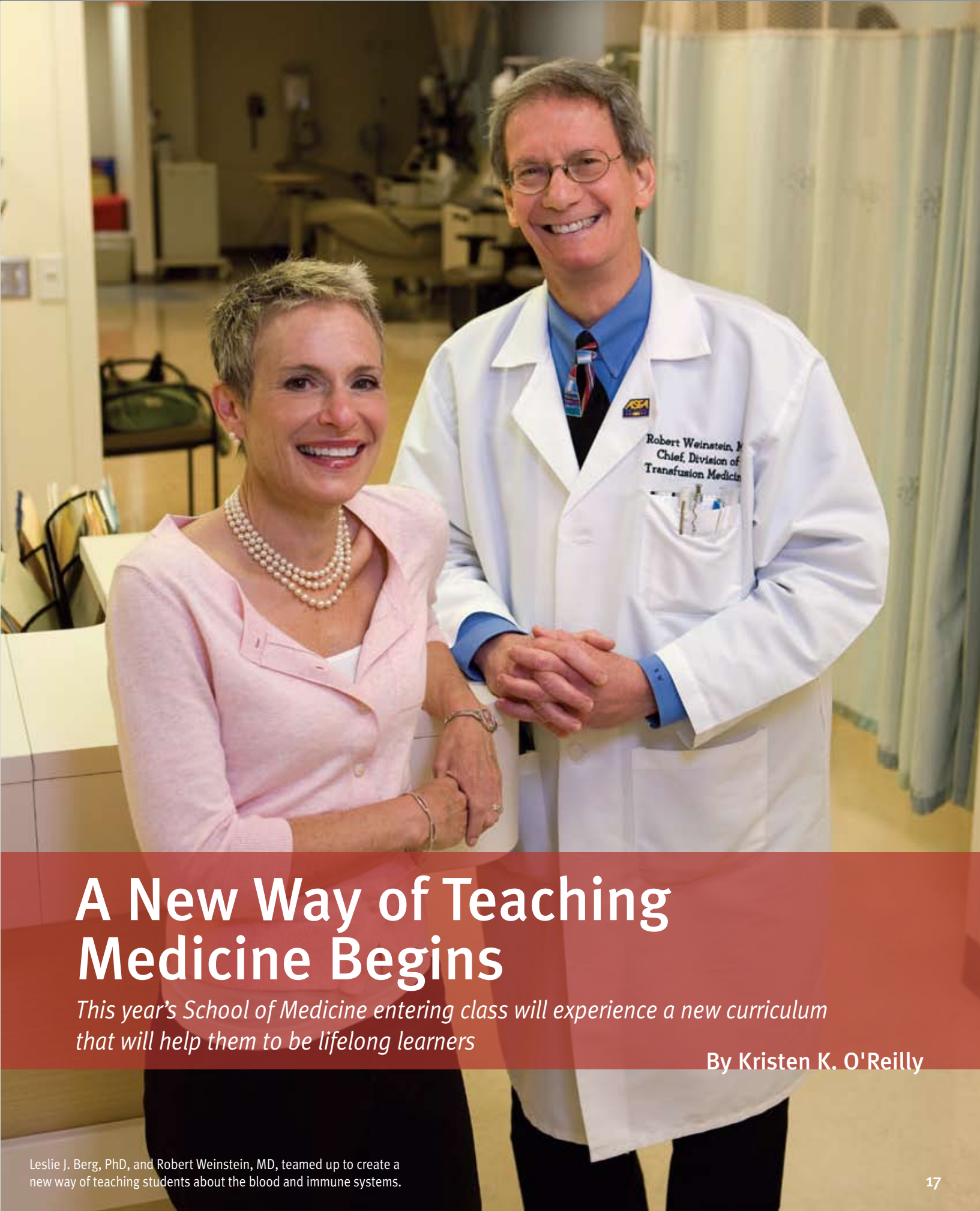
Much of the funding helps states meet their extensive obligations under the act, and some is specifically targeted to states that partner with academic institutions. “We have unprecedented opportunities to partner with Massachusetts and other states to work on health care quality and delivery improvement,” said CHLE Senior Research Policy Analyst Andrew Cohen, MA, who prepared the summary.

Another CHLE report, sponsored by the Blue Cross Blue Shield of Massachusetts Foundation and the Massachusetts Health Policy Forum, examines how the Massachusetts and federal approaches to health reform compare. The report, “Reforming Reform: What the Patient Protection and Affordable Care Act Means for Massachusetts,” analyzes and explains the differences in federal and state approaches and highlights the main challenges for policymakers.

Established in 2007 to provide Commonwealth Medicine and its clients with expertise in the interpretation, implementation and economic effects of changing health laws, CHLE partners with policy leaders in Massachusetts and in several New England states to enhance their pursuit of better health care delivery and financing models. CHLE’s expertise helps address the challenges of free care, uncompensated care financing and long-term care financing; payment reform; access for individuals with disabilities; and the alignment of existing state-based reforms with new federal mandates and policies.

Besides CHLE, knowledge and experience to address health care reform’s challenges and opportunities emanate from every corner of Commonwealth Medicine. Indeed, the Medical School’s far-reaching public health care consulting arm has on many fronts been advancing health care reform long before the passage of PPACA. Examples include allied health workforce development initiatives by Massachusetts Area Health Education Centers, whose six centers statewide, funded by UMMS and the federal government, train a diverse range of health professionals to practice in communities where the need is greatest. CHPR will continue to explore models of care to improve quality and save money, including patient-centered medical homes and accountable care organizations. CWM’s clinical programs, including Disability Evaluation Services, the Nursing Home Initiative and Clinical Pharmacy Services, to name just a few, all address health care access and delivery issues; and the Center for Health Care Financing has become a nationally recognized resource for financing health care benefits for vulnerable populations.

“We have been involved with these issues for so long,” said Sullivan. “The new law gives us even more opportunities to work with Massachusetts and other states to help them realize the promise and benefits of health care reform. We are in the right place at the right time.”



# A New Way of Teaching Medicine Begins

*This year’s School of Medicine entering class will experience a new curriculum that will help them to be lifelong learners*

By Kristen K. O'Reilly

Leslie J. Berg, PhD, and Robert Weinstein, MD, teamed up to create a new way of teaching students about the blood and immune systems.



**When Nancy Skehan, MD ’o6, started at UMass Medical School in 2002, the structure of the curriculum** was not unlike what students had experienced 30 years before, when the School of Medicine first opened: two years of basic science courses, where she acquired important foundational knowledge in subjects such as anatomy, physiology and microbiology, followed by two years of clinical rotations, where she put that basic science knowledge to use while serving as an active member of a health care team.

“In our first two years, we were tested on our ability to memorize and regurgitate information presented in a lecture,” said Dr. Skehan, who is finishing up as chief resident of internal medicine at UMass Memorial Medical Center. “It was good information, but at the time, I had no context for how I would be using it. And when the clinical years came around, I was racking my brains for the basic science information I had learned in my first two years of school.”

The complaint is common among medical students, who often struggle through the first two theoretical years in classrooms while eagerly awaiting the hands-on learning in the clinic. In fact, despite significant advances in *what* is taught, *how* students are taught at most U.S. medical schools can be traced back to the Flexner Report of 1910, which is credited with reforming medical education in the United States.

At UMass Medical School, all that is changing. When first-year students arrive on campus this August, they will be taught the practice of medicine in a new way. They will experience a fundamental change in the way courses are constructed, with basic science and clinical practice woven throughout all four years. But even more significantly, they will be expected to learn differently—both on their own and from faculty mentors and fellow students. They will be taught using nontraditional methods to take advantage of advances in technology. And they will be asked to master learning methods that will prepare them to be lifelong learners.

“Students will be in the clinic sooner, working in partnership with the basic sciences. They will focus more on the ability to learn and less on the ability to memorize,” said Michele P. Pugnaire, MD, senior associate dean for educational affairs and professor of family medicine & community health. “Learning on their own and learning in groups is the way they will be learning throughout their professional lives.”

**An intricate group effort**

The significance of this change cannot be overstated. The new Learner-Centered Integrated Curriculum (LInC) has involved years of study and thousands of hours of discussion and planning by more than 400 members of the UMMS and UMass Memorial community. Finally seeing the hard work come to life in August will be a milestone for the many individuals involved.

“It is beyond exciting,” said Melissa Fischer, MD, MEd, associate dean for undergraduate education, associate professor of medicine and chair of the LInC trustees, a group of UMMS faculty, staff, alumni and students providing overall direction and guidance for the redesign. “I am seeing layer upon layer of enthusiasm from all parts of the school.”

Like transplanting a giant tree, moving the curriculum in a different direction is a formidable undertaking, especially since the roots are more than 100 years deep. The genesis of the redesign dates back to 2003, when the School of Medicine defined six interrelated competencies that all graduates are expected to acquire: physician as professional, scientist, communicator, clinical problem solver, patient and community advocate, and person.

Once these competencies were established, the limitations of the traditional curriculum structure were exposed, according to Dr. Pugnaire. Representatives from all parts of the School of Medicine community, including current students and alumni, were recruited to start a curriculum redesign from the ground up. An intricate system of steering committees, advisory and consulting groups and design teams was formed, tapping every part of the school and involving hundreds of participants.

Many volunteers relished the idea that they would be making a difference in the way future medical students are prepared for the profession. “It’s a unique way to give back to the school,” said Laura Spring, a rising fourth-year student who is a LInC trustee. Despite the fact that she won’t experience the new curriculum herself, she said, “We are in a good position to give feedback and contribute.”

“As a recent graduate and current resident, I could recognize the shortcomings and redundancies of the existing structure,” said Skehan, who is also a LInC trustee. “It was a great opportunity to start from scratch.”

**A new approach to teaching**

A key element in LInC is the integration of basic science and clinical education into entirely new courses that focus on broader organ systems. Most new courses are being piloted by co-leaders from both worlds, all of whom were nominated by their department chairs.

For example, Leslie J. Berg, PhD, professor of pathology, and Robert Weinstein, MD, professor of medicine & pathology, had little professional interaction until recently when the two were named co-leaders of a new course called “Host Defense and Blood.”

Dr. Berg has taught courses on immunology and immuno-pathology for so long that she can create a lesson plan in her head. But she’s never ordered a test on a patient to diagnose an immunological disorder. Dr. Weinstein, chief of transfusion medicine at UMass Memorial, is comfortable teaching students the questions to ask a patient presenting with certain symptoms, but he has comparatively little experience in the classroom. The two have combined their expertise to create a new course that focuses on the interaction between the blood and immune systems, and encourages problem solving using real cases of hematologic and immune disorders.

Throughout the course, they are planning to tap other expert faculty to paint a comprehensive picture of the blood, immune and inflammatory systems, including learning about drugs related

“Ultimately, we hope to train better doctors who can work within frameworks of changing medical knowledge and health care systems while remaining patient-centered. We are focusing on competencies and on the skills that will allow our graduates to continue to build on what they learn here.”

—Melissa Fischer, MD, MEd

Far left, Michele P. Pugnaire, MD, left, and Melissa Fischer, MD, MEd. Center, Nancy Skehan, MD ’o6, offered her perspective as a recent graduate and resident as a LInC trustee. Right, students will be in the clinical setting sooner with the new curriculum.





to the systems, a subject that in the past would have been covered during a broader pharmacology class. Likewise, they will focus on blood cancers such as leukemia, which would have been covered in a class on cancer in the previous curriculum.

“Before, courses used to be very autonomous. I never worried about what someone taught in infectious diseases, even though I was teaching immunology,” said Berg. “Now, all the course directors can see the topics covered in every other course and see where things might overlap. It’s a real exchange of information.”

“I might have had three different lectures on diabetes from three different points of view,” said Skehan on her educational experience. “The information was always in silos. The new curriculum lays it all out and you begin to see it in a more cohesive fashion.”

Added to the mix is the requirement that students receive information in creative and non-traditional ways—through online learning, case studies and other innovative methods. All incoming students will be required to have laptops to facilitate this new model.

“Actual lecture time is being decreased by 25 percent,” said Weinstein. “But there is still information that needs to be exchanged, and we have to find nontraditional ways to do that. The whole thing is a creative exercise. We are trying to do something new here.”

“It’s really great to see the excitement from the faculty who are finding new ways of teaching a subject,” said Diana Robillard, a rising fourth-year student and LInC trustee.

“Faculty who have never taught first-year students are now playing a very important role,” agreed fellow student Spring. “They bring a lot of interesting ideas to the table about the way students are taught.”

### Learning through communities

The change in course structure is just one part of the LInC model. Another significant component—and perhaps the most visible—is the creation of learning communities. All entering first-year students will be assigned to one of five “houses,” each with regionally significant names: Burncoat, Kelly, Tatnuck, Quinsigamond and Blackstone. Each house will include 100 students—four 25-student cohorts from all four class years. These social and academic homes will be overseen by faculty mentors, four per house, who will act as advisors, teachers and career development coaches. Learning communities will also allow more inter-class interaction, an important element missing from the traditional structure, where students in the first two years rarely crossed paths with students already in their clinical years.

“It’s about a transfer of knowledge. Students in upper classes can teach what they have learned through experience. Newer students can talk about the latest teaching methods or information they gathered from evolving technology,” said Pugnaire. “They will learn from each other because when they are out in the real world, that’s how they will continue to learn.”

The learning communities, which actually began informally last year thanks to a grass-roots effort led by current students, have dedicated space in the Medical School building at the moment. But when the Albert Sherman Center opens in 2012, the five houses will occupy two floors, with office and meeting rooms across from the standardized patient and simulation centers. This concept of home will become even more important as class time is reduced, and along with it, a significant portion of the student interaction that happens while hanging out in the lecture halls.

“The Sherman Center will be the hub, the heart and soul of the medical school community,” said Pugnaire. “Students will always have a place to go.”

### A measure of success

While there will be satisfaction surveys given to students and residents, evaluations and data collected from residency directors and hospital officials to judge the preparedness of future School of Medicine alumni, as well as faculty feedback as the curriculum is fully implemented over the next four years, the true measure of the success of LInC will be less tangible.

“Ultimately, we hope to train better doctors who can work within frameworks of changing medical knowledge and health care systems while remaining patient-centered,” said Dr. Fischer. “We are focusing on competencies and on the skills that will allow our graduates to continue to build on what they learn here.”

“The most important thing we can teach these medical students is how to learn on their own,” agreed Weinstein. “Everything we teach has a half-life of relevancy. We hope that we are planting seeds to produce a crop of new doctors.”

“The curriculum is going to be more modern and relevant,” said Skehan. “Medical knowledge is exploding. It’s not feasible for medical schools to tread water. In a way, this had to happen.”

# Vitae:Grants and Research

In 1978, when UMMS first published its magazine, faculty received grant funding totaling \$2 million; by 2010, funding had grown to \$250 million, an amount that places us among the top research institutions in the country. Due to the high volume of grants awarded to UMMS faculty, we now post a comprehensive list at [www.umassmed.edu/Vitae/grants](http://www.umassmed.edu/Vitae/grants). In this section, we feature researchers describing their funded work in their own words, as well as their hopes about how their findings may impact the world.



**Carol Bova PhD, RN, ANP,**  
*associate professor of nursing  
and medicine*

*Feasibility of a HCV Decision-making  
Intervention among HIV-infected  
Adults*, National Institute of Nursing  
Research, one year, \$205,417;  
recommended for one more year  
\$246,750

Hepatitis C virus (HCV) infection  
is the most common liver-

associate problem experienced by adults with HIV infection. However, only a small percentage of persons with HIV and HCV have received HCV treatment. The purpose of this study is to test a group intervention that will help patients make informed decisions about whether to consider hepatitis C treatment or to watch and wait.

The intervention includes four group sessions that will be held weekly with five to six patients in each group. The sessions will help patients learn more about HCV, work on communication and decision-making skills and reframe negative thoughts about HCV treatment. Outcomes of this study will tell us whether this intervention has potential to improve HCV treatment decision-making among adults with HIV/HCV co-infection (and a full-scale randomized control trial will be planned). We will also gain a greater understanding about HCV knowledge, decisional conflict, patient-health care provider communication, health-related quality of life and HCV symptoms in this population.

I started out as a nurse practitioner in the HIV clinic in 1988 and became interested in HIV research during the early days of the pandemic. I was fortunate enough to continue in clinical practice while earning a PhD at Boston College and completing a postdoctoral fellowship at Yale University. I chose UMMS for several reasons. First, my patient population and research contacts are here. I work with terrific clinical experts who are supportive and help inform my research ideas. Second, I am deeply committed to public higher education and making doctoral education accessible to nurses in the commonwealth. Third, the faculty and staff in the Graduate School of Nursing are among the best I have worked with and the research enterprise within the GSN is continuing to grow and prosper. I firmly believe that the GSN is the place to be in Massachusetts if you are a nurse educator or a nursing PhD student.



**Oliver J. Rando, MD, PhD,**  
*assistant professor of biochemistry  
& molecular pharmacology*

*Transgenerational Effects of Diet  
in Mammals*, National Institute of  
General Medical Sciences, one year,  
\$328,167; recommended for three  
more years, \$987,000

My research in general focuses  
on a phenomenon known as  
“epigenetic inheritance,” which

is the inheritance of information beyond the DNA sequence. A straightforward example of this is in cell-type inheritance in the body—virtually every one of your cells has the same genome (having all come from one fertilized egg), but when a liver cell divides, it always results in two liver cells, not skin or kidney cells. Thus, the liver cells are inheriting the genome, but also additional “epigenetic” information—the state of “liverness.” My lab is interested in how epigenetic inheritance works, and how and why certain features are epigenetically inherited.

Our grant concerns a proposal to test whether epigenetic inheritance carries environmental information from fathers to their children. In other words, if we take two genetically-identical mice and feed them different diets, will their offspring be epigenetically different from one another? We have preliminary evidence that suggests this is true, and a small amount of epidemiological data in humans suggests it might be true as well. Specifically, a study in Overkalix, Sweden, suggests that poor diet during your paternal grandfather’s adolescence might predispose you to higher risk of diabetes, obesity and cardiovascular disease.

I have always been interested in science and math, and love solving puzzles. My father is a scientist and science always seemed like a great way to have a career where you work with your mind. As one of my dad’s mentors said, science is the best compromise between being an artist and making a living!

UMass Medical School is one of the most exciting research institutions in the world. We have phenomenal scientists in all sorts of areas of modern biomedical science, and we also have one of the friendliest environments I have ever been associated with.

A more complete list of recent grants is available at [www.umassmed.edu/Vitae/grants](http://www.umassmed.edu/Vitae/grants)



June's Commencement ceremony capped another extraordinary year for our campus. We continue to attract outstanding students even after increasing capacity in response to our nation's need for scientists, nurses and physicians.

## CHANCELLOR'S MESSAGE

Our faculty and students continue to win prizes, publish seminal works and attract essential research funding—this year in excess of \$250 million. We entered a nationwide competition to be designated by the National Institutes of Health as a Center for Clinical and Translation Science and received a near-perfect score on our application. As a result, we were awarded a five-year, \$20 million grant that places us among an elite group of medical schools that are bringing discoveries from the bench to the bedside and into our communities.

On our Worcester campus, the Ambulatory Care Center opened this summer, and will house our academic health sciences center's cardiovascular, cancer, musculoskeletal and diabetes Centers of Excellence.

Also opening this summer is the new Integrated Teaching and Learning Center in the Medical School building. This highly flexible teaching space will accommodate multiple configurations of 150 students in a state-of-the-art, technology-based learning setting.

Construction of the Albert Sherman Center has commenced. When completed in 2012, the Sherman Center will house new campus and educational spaces, in addition to increased research space to accommodate our Advanced Therapeutics Cluster, comprising the RNA Therapeutics Institute, the Gene Therapy Center and the Center for Stem Cell and Regenerative Medicine.

Our state's only public academic health sciences center is flourishing. We educate scientists and health care practitioners; we care for those who are most in need; we are at the forefront of innovation and scientific discovery; and we serve our communities.

Our graduates, however, are our most important accomplishment, and it is a privilege for our faculty to have the opportunity to educate and mentor our students during their time on our campus and at our clinical affiliates. As health care reform sweeps across our nation, we are pleased that our graduates will be the ones to whom we entrust the future of science and health care.



As a new academic year is upon us, I am reminded of my message to our recent graduates:

“Ensure that integrity infuses your every effort.

Be conscious of conflicts of interest that may arise and never compromise the best interests of your research subjects or patients for scientific or financial gain.

For those who will have the privilege to care for others, listen to the needs of their hearts.

When patients come to you with their concerns and burdens, pause at that moment and extend your hands and heart to them. For sure, not all days will be easy, nor all nights restful; yet know that you are not alone.

Touch the hands of your patients, join the hands of your colleagues, hold the hands of your mentors, and you will bring comfort to those for whom you care. We shall watch in great anticipation as you chart your futures. Be mindful that our communities, our commonwealth and our nation need you. We need your intellect and innovation. We need your care and compassion. We need your humility and humanity.

Most important, we need the thoughts in your minds to direct your hands and guide your hearts as you begin a life in service to others.”

Michael F. Collins, MD  
Chancellor, University of Massachusetts Medical School  
Senior Vice President for the Health Sciences, University of Massachusetts

## 1974

**Richard Aghababian, MD**, was recently elected vice president of the Massachusetts Medical Society.

## 1976

**Michael Foley, MD**, served for 15 years as a trustee of the University of Massachusetts and was the 2009 recipient of the Distinguished Alumni Service Award from UMass Amherst. Dr. Foley was also recognized for his 25 years as the internal medicine consultant for the Boston Red Sox and the-physician-in-attendance at Fenway Park. He threw the ceremonial first pitch before a crowd of 35,000 at Fenway on Saturday, May 30.

## 1977

**Bernard T. McNamara, MD**, married Mia Jahng on Jan. 30, 2010, in Redondo Beach, Calif. They had a small beach ceremony, in the Baha'I Faith, with Dr. McNamara's sons, Brendan, 17, and Dylan, 15, as well as Mia's mother, and Dr. McNamara's best friend, Keith. They also had a formal reception on April 17 at the Neighborhood Club in Quincy, Mass., for East Coast family and friends and a second formal reception on May 1 at the Los Verdes Golf Course in California for West Coast family and friends.

**Robert Klugman, MD**, senior vice president, chief quality officer and medical director of managed care at UMass Memorial Medical Center, marked a milestone this June. His medical practice celebrated 30 years of caring for patients in the greater Westborough community.

## 1981

**Henry Driscoll, MD**, has been appointed section chief of endocrinology in the department of internal medicine at Marshall University School of Medicine. He also received an endowed professorship. Dr. Driscoll is the first *Joseph M. Farrell, MD, Professor of Endocrinology* at Marshall University.

## 1984

**Nancy Fontneau, MD**, was named vice chair for faculty affairs and education in the department of neurology at UMass Memorial Medical Center.

## 1985

**Bradford D. Drury, MD, FACS**, lives in coastal North Carolina with his wife, Susan, and their two children, Sarah, who is a senior in high school, and Ben, who is a sophomore.

**Robert Alan Lancey Jr., MD**, was the guest speaker at the sixth annual Rural Three for Tobacco Free Communities awards event on April 14. Dr. Lancey presented the talk “The Real Future of Cardiac Care.” Lancey is the chief of cardiac surgery and a co-director of the Bassett Heart Care Institute in Cooperstown, N.Y., and also teaches “Up Close Cardiac Surgery,” a class for seventh graders that is designed to promote a heart-healthy lifestyle.

## 1986

**Mary P. McGowan, MD**, has co-authored her first novel, *Emily Klein's Diary*. The book, which carries an endorsement from former President Bill Clinton on the back cover, chronicles Emily Klein's path to a healthier lifestyle as she struggles with acceptance as an overweight 13-year-old. It is available on Amazon.com or at EmilyKleinsDiary.com.

## 1987

**Charles Hemenway, MD**, has joined the pediatric hematology/oncology division at Provena Saint Joseph Medical Center in Joliet, Ill.

## 1989

**Elizabeth Fuller, MD**, recently joined Harrington Physician Services in Charlton, Mass.



The School of Medicine Reunion on May 1 brought alumni from the classes of '75, '80, '85, '90, '95, '00 and '05 back to campus. At left are members of the class of 1985: from left, Thomas Browning, MD; Karen Shedlack, MD; David Gitlin, MD; Elizabeth Vinton, MD; Diane Savarese, MD; Elizabeth Kass, MD; Joanne Connaughton, MD; and Diane Kaufman, MD.





Faculty Ties Highlighted at Commencement

For UMass Medical School Assistant Professor of Medicine Judith A. Stebulis, MD, watching her son Matthew Stebulis walk across the stage brought back not-too-distant memories of her own UMass Worcester graduation in 1998. Read about this mother-

son duo, as well as other memorable stories from the 2010 Commencement, at [www.umassmed.edu/commencement](http://www.umassmed.edu/commencement).

CALENDAR

Investiture

Wednesday, Sept. 15, 2010, 4 p.m.  
UMass Medical School

Convocation

Thursday, Sept. 16, 2010, 10 a.m.  
UMass Medical School

White Coat Ceremony

Thursday, Sept. 16, 2010, 4 p.m.  
UMass Medical School

Walk to Cure Cancer

Sunday, Sept. 26, 2010, noon  
UMass Medical School

Annual Alumni Scholarship Dinner

Wednesday, Sept. 29, 2010, 6–8:30 p.m.  
UMass Medical School

School of Medicine Alumni Reunion

Celebrating the classes of 1976, 1981,  
1986, 1991, 1996, 2001, 2006  
Saturday, May 14, 2011  
UMass Medical School

For more information about these events, contact the Office of Alumni Relations at 508-856-1593, [alumni@umassmed.edu](mailto:alumni@umassmed.edu) or [www.NetworkUMass.com/Medical](http://www.NetworkUMass.com/Medical)

1993

**Erin Marcus, MD**, recently received a Cancer Control Career Development Award for Primary Care Physicians given nationally by the American Cancer Society. The \$300,000 award is distributed over three years. Her project focuses on ways to improve the communication of mammography results. In addition, Dr. Marcus received a grant from the Ford Foundation to write about health disparities, including an article for New America Media, the nation’s largest publisher of ethnic media. Her columns were geared toward readers with limited financial resources and access to care.

1994

**Andrea Kronman, MD, MSc**, recently received a Cancer Control Career Development Award for Primary Care Physicians given nationally by the American Cancer Society. The \$300,000 award is distributed over three years. Her project examines the role of depression in cancer screening behavior, focusing on follow-up to abnormal pap smears and mammograms.

1995

**Aaron Gleckman, MD**, is the medical director of the histopathology and cytology laboratory at Urologic Specialists of New England, in West Warwick, R.I. He is married to Dorit Kagy, and has four children—Georgia, Isabella, Marnie and Isaac.

**Christine Rooney, MD**, is the executive producer of “Jonathan Bird’s Blue World,” which was shown on WGBH Kids on Saturdays and Sundays from late November through March 2010. “Jonathan Bird’s Blue World” has been shown throughout half of the United States, and received a New England Emmy Award for Outstanding Segment on May 22.

1998

**Sharon Bachman, MD**, is an assistant professor at the University of Missouri School of Medicine and was recently initiated as a fellow of the American College of Surgeons (ACS). Her convocation ceremony was held during the ACS 95th annual Clinical Congress in Chicago in October 2009.

1999

**Timothy Gibson, MD**, chief of pediatric hospital medicine at UMass Memorial Children’s Medical Center, recently wrote an article in *Bay State Parent* magazine about back sleeping and misshapen heads. The story explains the good news behind the rise in babies with misshapen heads and the reduction of Sudden Infant Death Syndrome.

2000

**Jeffrey Hopkins, MD**, became chair of the department of emergency medicine at Milford Regional Medical Center in January 2010.

2002

**Jordan H. Eisenstock, MD**, has been named neurorehabilitation program director at Fairlawn Rehabilitation Hospital. He is also the site director of neurology education at UMass Memorial Medical Center, Memorial Campus, as well as an assistant professor of neurology and psychiatry at UMass Medical School.

**Anna Rudnicki, MD**, has joined UMass Memorial Medical Center’s pulmonary, allergy and critical care division. She has also been appointed an assistant professor of medicine at UMass Medical School.

2003

**Michelle Conroy, MD**, has joined UMass Memorial Medical Center’s pulmonary, allergy and critical care division. She is has also been appointed an assistant professor of medicine at UMass Medical School.

**Leah Doret, MD**, has recently joined Harrington Physician Services in Charlton, Mass.

**Jaimie Kane, MD**, and her husband, Jay Candelmo, are happy to announce the birth of their son, Desmond James Candelmo, on Oct. 30, 2009. Dr. Kane is a pediatrician at Child Health Associates in Auburn, Mass.

2004

**Rebecca A. Zanonato, MD**, has joined UMass Memorial Medical Group and the department of anesthesiology at UMass Memorial Medical Center. Dr. Zanonato also was appointed an assistant professor of anesthesiology at UMass Medical School.

2005

**Andrew Cocchiarella, MD**, has joined the department of anesthesiology at UMass Memorial Medical Center. He is also an assistant professor of anesthesiology at UMass Medical School.

**Rachael McColl Vuolo, MD**, is now practicing internal medicine and general pediatric care at one of UMass Memorial Medical Center’s community practice sites in Marlborough.

**Ronald Ste. Marie Jr., MD**, joined the division of gastroenterology and the gastrointestinal and hepatology hospital medical service team at UMass Memorial Medical



Jacqueline S. Bergeron, RN, MSN ’95

Until 2006, Jackie Bergeron was sure she would spend her whole career at UMass Memorial Health Care. She started as a staff nurse in 1978 and by 2006, had worked her way up to associate chief nursing officer. She loved her job and loved the people she worked with.

Her plans changed when she saw an opportunity to participate in a professional experience that she couldn’t pass up. The Lahey Clinic was looking for a leader for its effort to obtain Magnet Designation from the American Nurses Credentialing Center, a rigorous process that requires an experienced nursing leader capable of assessing and articulating the characteristics that qualify a health care institution for such a prestigious international distinction.

“I was ready for a new challenge,” said Bergeron. “It had always been my professional goal to participate in seeking Magnet, which is really the gold standard in nursing excellence and patient care, and I could not let this opportunity go by.” Describing it as a career-defining experience, Bergeron, as medical-surgical & finance associate chief nursing officer, successfully co-led Lahey to an ANCC Magnet designation in 2009, placing the hospital in a very elite group of health care organizations worldwide. “Our application was accepted with no changes, which is very rare,” said Bergeron. “It’s the hardest thing I’ve ever done and it was a real labor of love, with many people involved, from staff nurses to clinical managers to senior leaders.” She described it as “magical” when the results were announced.

In addition to being a magical moment for Lahey, it was an a-ha moment for Bergeron, who realized through the experience that she had much more to give professionally. She decided to go back to school, and when she heard about the Graduate School of Nursing’s new Doctor of Nursing Practice (DNP) program, she jumped at the chance to be a part of it. “I knew that under Paulette’s [Seymour-Route] direction, the program would be exemplary and I have not been disappointed. The instructors are fantastic and being a student again is invigorating,” she said. She plans to use her DNP to become more involved in shaping policy in light of national health care reform, saying that public advocacy and community involvement are woven into the fabric of the program, as they are the whole institution.





## **Sonya Fonseca, PhD '09**

Sonya Fonseca has found a way to have the best of both worlds. Despite having formally left the world of academia to enter industry upon graduation from the Graduate School of Biomedical Sciences (GSBS), she is keeping her options open. While immersed in the highly competitive Presidential

Postdoctoral Fellowship at Novartis Institutes for Biomedical Research, Dr. Fonseca is networking with new colleagues while retaining a collaborative relationship with her academic mentor, Fumihiko Urano, MD, PhD, associate professor of molecular medicine—a collaboration that is fundamental to the project proposal that landed her the fellowship.

Each year, Novartis selects just a handful of innovative scientists from academia to become fellows and collaborate with leading pharmaceutical discovery scientists using the resources of a large pharmaceutical company. Fonseca is exploring the role of ER (endoplasmic reticulum) stress signaling in pancreatic beta cell function and proliferation as a means of diabetes therapy and/or prevention. “What stands out the most in my first year as a postdoc is that I’ve already published a paper and am on track to publish another one, in addition to giving a talk in Paris last fall,” said Fonseca. “What has surprised me the most is that there are so many similarities between academia and industry.”

Reflecting on her education in the GSBS, Fonseca said, “I feel that I got a very balanced education. I learned many molecular biology techniques and also had the opportunity to give talks at many prestigious conferences.” She added, “My mentor, Fumi Urano, was quite wonderful. He really made sure that I had every opportunity to be successful. He continues to be inspirational—he has such a positive, refreshing outlook about research. My favorite words of wisdom from him are *Kai Zen*—take that which is good and make it better!”

In addition to her fellowship, Fonseca said that her two young daughters take up most of her free time.

Center. He is also an assistant professor of medicine at UMass Medical School.

**Andrew Watt, MD**, was appointed vice president for information services and systems at Southern New Hampshire Medical Center. Dr. Watt is serving as chief medical informatics officer and chief information officer while continuing to practice as an emergency medicine physician at the medical center.

**Lauren Alberta-Wszolek, MD**, has joined UMass Memorial Medical Center's division of dermatology. She has also been appointed an assistant professor of medicine at UMass Medical School.

## **2008**

**K. Thirza Campbell, MD** and **Craig R. Lareau, MD**, were married on Aug. 29, 2009, at Sacred Heart Church in Springfield, Mass. They reside in Rumford, R.I.

## **Graduate School of Biomedical Sciences 1998**

**Lorree Griffin Burns, PhD**, has written her second book for the Houghton Mifflin Harcourt's highly regarded “Scientists in the Field” Series. The book is titled *The Hive Detectives: Chronicle of a Honey Bee Catastrophe*. Her first book, published in 2007, is *Tracking Trash: Flotsam, Jetsam and the Science of Ocean Motion*.

## **Graduate School of Nursing 1996**

**Deborah Plotkin, MS, RN**, was the guest speaker at a traditional pinning ceremony at Metrowest Community College on Jan. 8, 2010, which celebrated the success of 32 new graduates of the college's practical nursing program.

## **2001**

**Richard Boyajian, MS, RN**, was selected as associate editor for the *Clinical Journal of Oncology Nursing*. He is also currently a nurse practitioner in the Lance Armstrong Foundation Adult Survivorship Program at Dana Farber Cancer Institute.

## **2008**

**Joan S. Morrison, MS, RN**, proudly welcomed twin grandsons, Nate and Theo, on May 22, 2009. Joan and her husband, George, are planning to relocate to New Haven, Conn., in June 2010 to be more involved with their grandsons. She will be seeking a new position in nursing education after two satisfying years at Quinsigamond Community College.

## **Thank you for supporting the alumni annual fund**

We are grateful to our alumni for your thoughtful contributions to the alumni annual fund. Your generosity allowed us to meet our alumni participation goals for the year. Alumni support allows us to continue offering a high-quality education that tuition and state funding alone cannot sustain. We are honored and grateful to count you among our donors.

Some of the newest members of our alumni community have also demonstrated their support through the tradition of a class gift. Members of the School of Medicine Class of 2010 chose a combination of two gifts to honor their UMMS experience: sponsoring the white coats that the members of the Class of 2014 will receive at their White Coat Ceremony in September to mark the beginning of their medical journey, and equipment for the new fitness center. The Doctor of Nursing Practice program's inaugural class also raised funds for a class gift. The four members of the DNP Class of 2010 donated a clock to the Graduate School of Nursing. The class gift is a wonderful way to begin a lifelong tradition of giving back to UMass Medical School.

On behalf of all the students who benefit from your annual support, thank you! We encourage you to continue your commitment to UMass Medical School.

To make a gift: [www.umassmed.edu/foundation/onlinegiving](http://www.umassmed.edu/foundation/onlinegiving)

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# Vitae: The Last Word



By John Sullivan, MD, Vice Provost for Research  
Professor, pediatrics and molecular medicine

*On July 14, the National Institutes of Health (NIH) announced that the University of Massachusetts Medical School was awarded a Clinical and Translational Science Award (CTSA) and will join 50 of the top medical institutions in the country in a network of research centers focused on clinical and translational science.*

invested in education and training of clinical investigators; the creation of information technology to support clinical research; and the establishment of the Department of Quantitative Health Sciences to provide biostatistical, epidemiological and medical informatics expertise, as well as a program focused on bioinformatics.

Over the summer, we will open the Conquering Diseases Clinical Research Center in the Ambulatory Care Center, where new treatments for a wide variety of diseases will be available. All patients and family members engaged with UMass Memorial Health Care will have the opportunity to participate as research volunteers in these exciting studies.

Finally, as we learned with the success in the basic sciences, outstanding research is done by outstanding faculty members. We are nearly half way in our commitment to recruit 80 new outstanding faculty members committed to clinical and translational research and we will complete this effort with the opening of the Albert Sherman Center in 2012.

Why did this happen at UMass Medical School? The leadership of Chancellor Michael F. Collins and Dean Terence R. Flotte were key enabling factors. Chancellor Collins' additional role as the University's senior vice president for the health sciences

enabled the UMass Center for Clinical and Translational Science to harness all the life science expertise that exists on our four sister campuses. Dean Flotte is an accomplished clinical investigator in gene therapy research and the Advanced Therapeutics Cluster. Bringing RNA biology, gene therapy and stem cell biology together in the Albert Sherman Center was his brainchild.

Together, Chancellor Collins and Dean Flotte committed more than \$450 million of institutional resources to the development of clinical and translational research at the Medical School. This was a key factor in the peer review process that awarded UMass this award.

This CTSA catapults UMass Medical School into the upper ranks of research institutions, positioning us alongside institutions like Harvard, Johns Hopkins and UCSF. The funds will allow us to take the fantastic knowledge base here and apply it to clinical applications that have direct impact on human diseases, such as ALS, diabetes and cancer. This is truly a proud moment for UMass Medical School. 📍

This is a transforming moment for the University, the Medical School and our clinical partner UMass Memorial Health Care. This CTSA grant signals to our community, the commonwealth and the nation that the UMass Center for Clinical and Translational Science is poised to make new discoveries that will change the practice of medicine.

How did this come about? In 2006, we conceived a plan to grow and develop the clinical research enterprise to reap the benefits of our world-class research enterprise, built through a major investment in the recruitment of more than 100 elite basic scientists. The effort started in the 1990s and received international recognition in 2006 with the awarding of the Nobel Prize in Medicine or Physiology to Craig Mello, PhD, for the co-discovery of RNA interference. Beginning in 2007, we

To read all about the CTSA grant and its implications, visit [www.umassmed.edu/ctsa/index.aspx](http://www.umassmed.edu/ctsa/index.aspx)

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