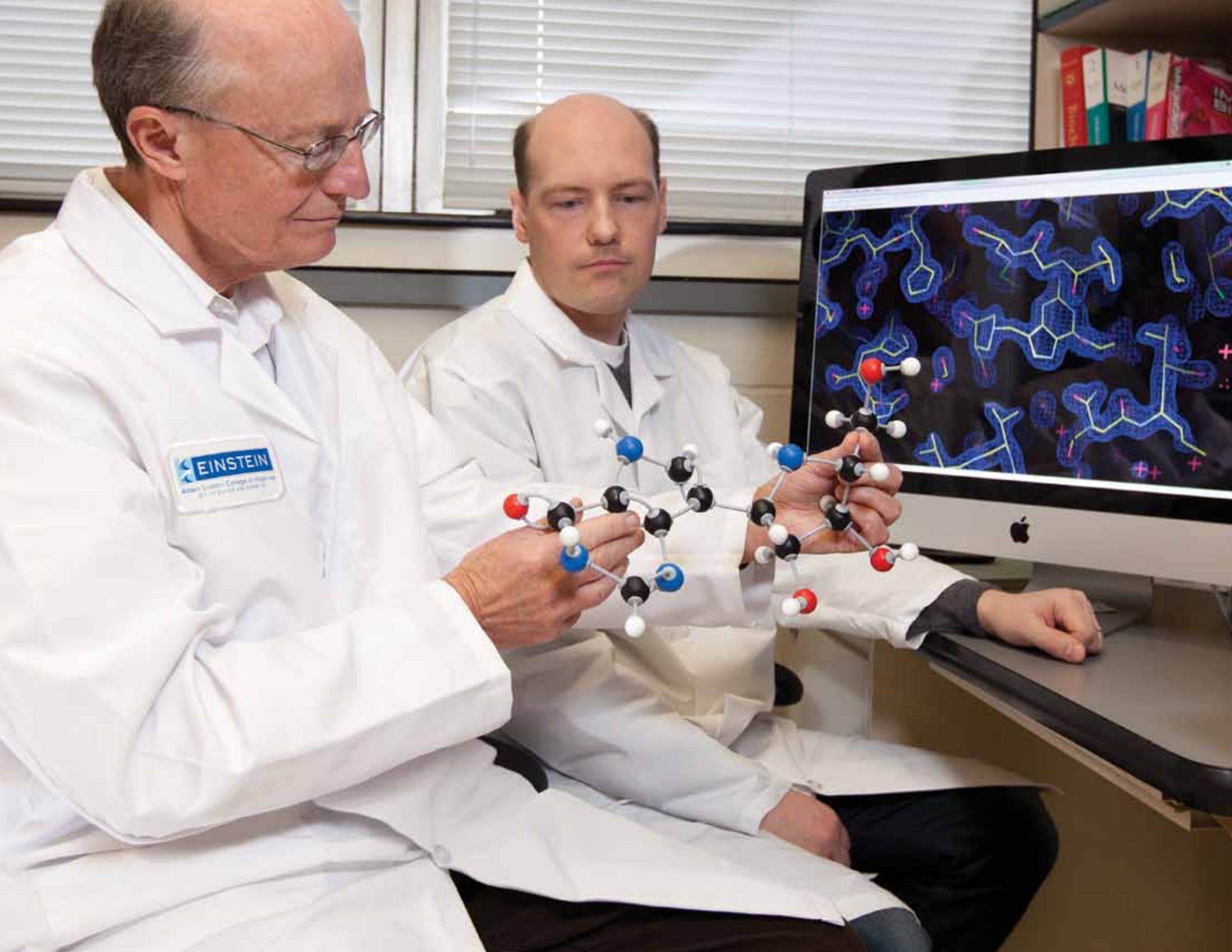
transforming human health

ANNUAL REPORT 2011–2012

EINSTEIN
Albert Einstein College of Medicine
OF YESHIVA UNIVERSITY


EINSTEIN

how we're changing medical research

On the cover: Vern Schramm, Ph.D., holds the structure of forodesine, the molecule he designed that is now in clinical trials for treating leukemia and lymphoma in children and adults.

Facing page: Dr. Schramm, on left, with Antti Haapalainen, Ph.D., a visiting post-doctoral scholar from Finland.

Vern Schramm, Ph.D., professor and Ruth Merns Chair in biochemistry, exemplifies how Einstein scientists are transforming health. He proposed an entirely new theory for developing drugs to treat diseases that have resisted existing therapies.

Dr. Schramm studies enzymes, which govern chemical reactions in all living cells by converting one molecule (the substrate) into another (the product). He has long been fascinated by the nature of the transition states that form during enzymatic reactions. Neither substrate nor product, they are ghostly intermediates to which the enzyme clings for a billionth of a millionth of a second.

Many types of cancer and other diseases could be treated by drugs that target specific enzymes. Dr. Schramm theorized that such drugs could be made by designing analogs closely resembling transition-state molecules but with one major difference: the analog would powerfully inhibit the enzyme by binding to it and not letting go.

Dr. Schramm's theory has led to a novel class of drugs called transition-state analog inhibitors. Two are in clinical trials: forodesine for treating leukemia and lymphoma, and BCX4208 for gout. Drugs to treat malaria and solid tumors such as lung and breast cancers are in development.

Richard G. Gorlick, M.D., professor and vice chair of pediatrics at Einstein and division chief of hematology/oncology, department of pediatrics, at The Children's Hospital at Montefiore, with a young patient.

how we further our mission

A TRANSFORMATIVE EDUCATION

At Yeshiva University we believe that a quality education involves more than just excellent classroom instruction, clinical skills and practical training. Our faculty must also ensure that graduates are imbued with ethical and moral sensitivity and are prepared to enter the world with a positive attitude and determination. These qualities have been with us from the day that Yeshiva University's second president, Samuel Belkin (1911–1976), realized his vision of a medical school associated with his university and persuaded the world's most famous scientist to give his name to the school.

Under the inspired leadership of a gifted dean and faculty, Einstein has continued to fulfill its promise of providing an incredibly rigorous medical education, and has sought to positively influence human health in wondrous ways.

This dedication to bettering the world exemplifies how Einstein fulfills its unique vision at home and in the broader community. This annual report illustrates how so many people—our outstanding researchers, compassionate clinicians, bright students and a large donor family whose support we value beyond words—make what we do possible and help inspire us to continue to excel.

Richard M. Joel, President
Yeshiva University
www.yu.edu

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message from the dean

Dear Friends,

Having spent much of my career at the National Institutes of Health before coming to Einstein, I found the news that we are now ranked 23rd among medical schools in terms of total funds secured from the NIH all the more remarkable, given our size compared to that of many of the distinguished institutions ranked both ahead of and behind us. I have congratulated our faculty on securing such crucial funding, and this truly objective measure confirms the success of our investigators and the strategic plan that organizes our efforts.

This annual report offers snapshots of our research excellence in developmental and genetic disorders, cancer, heart disease, eye diseases, population-based research and the study of aging. The report also describes Einstein's drive to create a new Center for Molecular Therapeutics and Drug Discovery, a key component of our updated strategic research plan.

Historically, academic research has confined itself to identifying the targets that drug companies later exploit. But over the past few years a multitude of factors—economic, organizational and intellectual—have conspired to dry up the pharmaceutical industry's pipeline for developing new drugs.

Last year, in an effort to drastically accelerate this process, the NIH announced that it was creating a National Center for Advancing Translational Sciences. Einstein's proposed Center for Molecular Therapeutics and Drug Discovery addresses that same critical need, answering the challenge posed by the NIH and by the American public. Aided by the powerful technologies available, Einstein faculty not only will identify novel targets for treating and preventing disease but also will explore new models for collaborating with industry to deliver vitally needed therapies to the American people.

Medical research and education continue to be incredibly expensive, and competition for every government or philanthropic dollar is intense. Thankfully, thousands of individuals, foundations and corporations are steadfast in their support of Einstein, and records of their partnership in discovery are found throughout this annual report.

I believe that the Overseers, supporters, generous alumni and potential new friends reading these pages will feel gratified by the stories we tell this year. And I hope our students and faculty will simply feel as I do: proud of what has taken place at Einstein this past year, and optimistic about our future.

With thanks and appreciation,

Allen M. Spiegel, M.D.
The Marilyn and Stanley M. Katz Dean

message from the chair

Dear Friends,

From where I sit as chair of the Board of Overseers, I marvel at Einstein's latest developments in science and discovery, documented in these pages.

I see new opportunities for our medical students to develop clinical skills, and new degree programs offered in public health and bioethics. I'm honestly thrilled about the consolidation of the Children's Evaluation and Rehabilitation Center—where I've been associated for what feels like a lifetime—into brand-new space in Van Etten. I'm terrifically excited about the possibilities of a new Center for Molecular Therapeutics and Drug Discovery.

And we're showing no signs of slowing down.

Einstein continues to attract faculty who integrate seamlessly into the fabric of our research thanks to factors such as our special relationship with Montefiore Medical Center, and pioneering work done by brilliant researchers such as Dr. Vern Schramm and his studies of enzymes.

Occasions such as the celebratory event held by the Men's and Women's Divisions that honored Overseers Linda Altman and Arnold Penner this past fall also help to advance Einstein. And I certainly view the election of five new Overseers as something important to our future.

These are only a few of the changes and developments that are discussed in this annual report.

Of course, these developments didn't just happen on their own. Each is the result of a collaborative effort among the dean, his staff, faculty and the Board of Overseers. Together, we mark our progress against the latest strategic research plan, and keep in mind the campus master plan that we drafted a few years ago. These living documents are our blueprints; they remind us where we have been and guide us to our ambitions.

Einstein's hard-working and productive faculty are at the frontiers of scientific research and managed to secure the largest award of NIH grants in Einstein's history last year. Their success was also predicated on the generosity of our Overseers and other benefactors, and even the tireless efforts of Bronx community leaders who petitioned the city and state on our behalf.

Yet as much as things change at Einstein, some things never change: our mission of scientific discovery for the improvement of human health all over the world; our dedication to the highest moral and ethical values; the emphasis on collegiality, cooperation and compassion. These are our values, evident all over our campus and wherever Einstein alumni are located. There are no silos; far from being an ivory tower, Einstein remains a beacon in the Bronx.

There is no substitute for a visit to Einstein (which I invite you to do!), but perhaps reading these pages will temporarily transport you to a terrific place, where everyone works in the hope of a healthier day for ourselves, our children and our grandchildren.

I thank all of our supporters, faculty and administrators, and students and alumni for the important roles they all play in this wonderful enterprise.

Ruth L. Gottesman, Ed.D.
Chair, Einstein Board of Overseers

what we've achieved at einstein

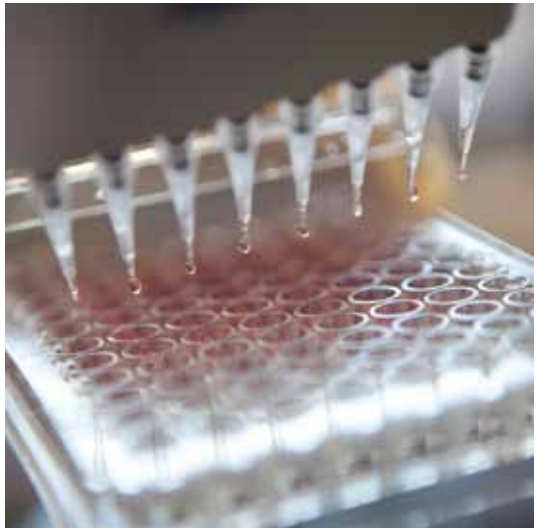
In 2011, Einstein scientists published 450 papers in peer-reviewed journals, including some of the most prestigious: *Cell*, *Journal of the American Chemical Society*, *Journal of Biological Chemistry*, *Nature*, *Proceedings of the National Academy of Sciences* and *Science*.

Emphasis on Education

Beginning in 1955, when the first class of 56 M.D. students arrived on campus, the College of Medicine's academic evolution has been a story of innovation and flexibility. Einstein was the first private medical school in New York City to establish an academic department of family medicine and the first to create a residency program emphasizing women's health. Today the College of Medicine offers its more than 1,000 students—medical, graduate and postdoctoral—an array of clinical, population research and laboratory experiences and degree programs. And despite today's harsh economic realities, many Einstein students have a firmer financial footing than they otherwise would, thanks to a number of generous education-minded supporters.

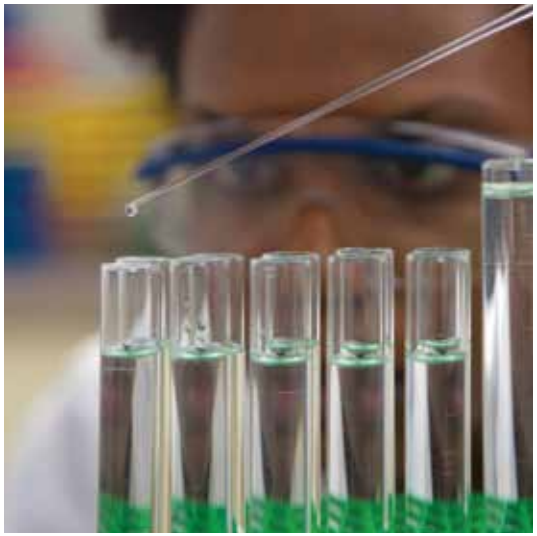
Overcoming Developmental Disorders

Developmental and genetic disorders encompass some of the most significant health problems affecting children. Autism spectrum disorders, dyslexia and rare genetic disorders such as Tay-Sachs can limit daily functioning and impede mobility, language and more. Einstein is ideally positioned to transform the lives of people with these disorders. Its nationally renowned Children's Evaluation and Rehabilitation Center serves more than 7,000 infants, children, adolescents and adults each year. And the Rose F. Kennedy Intellectual and Developmental Disabilities Research Center is now expanding its research and clinical care thanks to a recent $5.7 million grant from the National Institutes of Health.



Spurring Discoveries Into Drugs

Translational biomedical research is all about moving discoveries from the laboratory bench to the bedsides of patients as quickly as possible. One of the key goals of Einstein's strategic research plan is to create a new facility—the Center for Molecular Therapeutics and Drug Discovery—that would allow the College of Medicine to assume a larger role in translating its discoveries into solutions for transforming human health. With access to the center's state-of-the-art equipment and its staff of experts in computational chemistry, metabolomics and other specialties, Einstein researchers could move their discoveries farther along the research and development path that culminates in approved drugs.



Halting Cancer's Deadly Spread

In 1972, the Albert Einstein Cancer Center became one of the first cancer centers on a medical school campus to receive National Cancer Institute funding. The AECC has enjoyed continuous NCI support ever since. One major focus of its research is metastasis, the spread of cancer beyond a primary tumor to other parts of the body. In this report we describe the promising research on metastasis being carried out by two of Einstein's leading investigators.

Tackling the Number-One Killer

Einstein has played a major role in the evolution of cardiovascular science as we know it today. Most impressively, Einstein scientists were the first to recognize that the heart is a functioning muscle governed by the same rules as any other muscle in the body. Several new recruits in the recently opened Wilf Family Cardiovascular Research Institute are poised to build upon this legacy. Partnering with Montefiore, the University Hospital and academic medical center for Einstein, these scientists are working to unseat heart disease from its spot at the top of the mortality charts.

Lengthening Longevity

Over the past 15 years, Einstein has developed into one of the nation's leading centers for aging research. Work carried out by more than 60 Einstein scientists is providing important insights into the biology of aging: the changes that occur at the molecular level, deep within cells, and that underlie all the "symptoms"—from frailty to wrinkles, forgetfulness to cancer—that we associate with getting older. The efforts of three leading Einstein researchers to delay aging by counteracting these cellular changes are described in this report.

People Power

Einstein researchers have been studying the health of human populations—and of Bronx residents in particular—for more than 40 years. As noted in Einstein's strategic research plan: "Conducting research in human subjects requires diverse tools and expertise that can only be supplied by a multidisciplinary team of scientists and centralized resources." To that end, Einstein is reaching out to more populations, several of which are spotlighted in this annual report.

Eye on Research

Researchers in Einstein's department of ophthalmology and visual sciences are conducting studies showing that stem cells hold great potential for treating damaging diseases, including cataracts and macular degeneration. They are also focusing on the role of genes—and the factors that turn genes on and off—in eye development and cataracts. This year, Einstein received major funding from a private foundation, allowing its vision researchers to continue searching for ways to improve human eyesight.

Moving Einstein Forward

Since 1955, the leadership of our dynamic Overseers, the support of an ever-expanding philanthropic community and the devotion of a proud network of alumni have spurred Einstein's growth as a center for cutting-edge medical research and training. The names and faces of many Einstein supporters and alumni appear in these pages. Their dedication to advancing the mission of the College of Medicine has greatly contributed to Einstein's continued leadership in 21st-century medicine.

emphasis on education

teaching america's future physicians for more than 50 years

Einstein's Gottesman Clinical Skills Center opens; medical students can now practice examining and interacting with patients in a true-to-life setting.

Martha S. Grayson, M.D. '79, is recruited from New York Medical College as senior associate dean for medical education. Top priority: enhance the medical school curriculum.

Einstein's programs continue to evolve, from the new M.P.H. track and bioethics entries to international research studies and a paperless curriculum.

Einstein's 155 residency programs make it one of the largest postgraduate medical training centers in the United States.

WHERE INTELLECT AND HUMANISM MEET

Since opening its doors in 1955, Einstein has attracted bright and humanistic students. Recalls Irving London, M.D., founding chair of the department of medicine: "You're not only advancing medical care, you're doing it with compassion and an understanding heart."

In the half century since, education at Einstein has built on those values. Einstein's 155 residency programs make it one of the largest postgraduate medical training centers in the United States. The College of Medicine is home to some 2,500 faculty members who run labs at Einstein and work in the community and at Montefiore Medical Center—giving our students front-row seats to scientific discovery and patient care.

Thanks to new curriculum initiatives, Einstein medical students are now exposed earlier to communication skills and to clinical science, where they learn to solve problems relating directly to their coursework; in innovative new courses, Einstein graduate students learn how to bring insights from the classroom to promising research in the laboratory.

And this year, Einstein's offices of medical education and computer-based education decided it was time for students to learn how to work in the paperless world of electronic medical records. Freshmen now arrive in class with a laptop computer, PC, Mac or Tablet with wireless Internet capability and loaded with special software that allows them to take notes and highlight course materials directly. "A new learning management system, the Einstein Medical Education Database [eMed for short], allows more access to materials from any computer, and many functions can link to smart phones," says Martha S. Grayson, M.D. '79, senior associate dean for medical education and professor of clinical medicine in the department of medicine.

These are just a few of the education innovations that Einstein can be proud of this year.

Above, Martha Grayson, M.D. '79, senior associate dean for medical education.

VERN L. SCHRAMM, PH.D.: SUPPORTING EINSTEIN'S FUTURE

Vern L. Schramm, Ph.D., the Ruth Merns Chair in Biochemistry, has made a significant commitment to Einstein through his estate that will be used to recruit new faculty.

Dr. Schramm, an internationally respected investigator in his field and an exceptional teacher who has served as professor and chair of Einstein's biochemistry department since 1987, is an expert on enzymes. He is renowned for his groundbreaking work in designing "transition-state analogs"—molecules that target and powerfully inhibit enzymes that play key roles in disease. Two of the inhibitors that Dr. Schramm developed—treatments for gout and for T-cell cancers—are now being evaluated in clinical trials. Dr. Schramm was elected in 2007 to the National Academy of Sciences, the nation's most prestigious honorary society for scientists.

"I wanted to reward Einstein in some way for giving me the opportunity to work all these years in a stimulating and creative scientific environment with wonderful colleagues, and to make discoveries," said Dr. Schramm in explaining his decision to provide philanthropic support to the medical school. His gift will help ensure that the College of Medicine will continue to attract the most outstanding scientists.

George J. Fruhman, Ph.D., with Dean Allen M. Spiegel, M.D., at Commencement 2009.

GEORGE J. FRUHMAN, PH.D.: AN ENDURING LEGACY

Dr. Fruhman, a member of Einstein's founding faculty and associate professor of anatomy and structural biology for 50 years, was a beloved presence on the Einstein campus. His long and distinguished career as teacher and mentor to generations of Einstein students ended with his death last year at age 86.

Before his passing, Dr. Fruhman took an important and deliberate step in expressing his feelings for Einstein that will have an impact on the school and its students for generations: He created a multimillion-dollar bequest to Einstein through his estate, establishing a series of fully endowed four-year scholarships for medical students of intellectual merit.

This extraordinary gesture—one of the most generous investments in Einstein by a faculty member—will help support the most outstanding applicants in each class. According to his friends and those who knew of his plans, the magnitude of this gift reflects Dr. Fruhman's passion for education and his lifelong commitment to securing Einstein's position among the ranks of the nation's top-tier medical institutions.

The story of the Fruhman family is familiar to many. Dr. Fruhman was the only child of parents who fled the Holocaust and came to the United States. As explained by Allen M. Spiegel, M.D., Einstein's Marilyn and Stanley M. Katz Dean, while publicly announcing Dr. Fruhman's gift for the first time at Convocation last fall, "After his parents died, his only family in the world—quite literally—was the Einstein family. He lived only blocks away from campus and for decades could be seen walking to and from Einstein on the neighborhood streets."

In later years, Dr. Fruhman could be found most mornings in his department's conference room,

Dr. Fruhman took an important step that will have an impact on Einstein and its students for generations to come.

where students and colleagues would stop by for coffee and conversation. Friends described his high intellectual and scholarly standards, which he brought to everything he did. "He suffered neither fools nor foolishness easily," says Todd R. Olson, Ph.D., professor of anatomy and structural biology. "He challenged students, and the system, not only to be as good as they could be, but to be better—and to improve."

Colleagues and students recall his unswerving focus on teaching. "He set the extreme standard for dedication," says Robert H. Singer, Ph.D., professor and co-chair of the department of anatomy and structural biology. "To us, he was a teaching monk. He never spent money on himself and rarely, if ever, took a vacation. He had no interest in retiring. He was a small man with a big heart. Being around students gave his life meaning and kept him young."

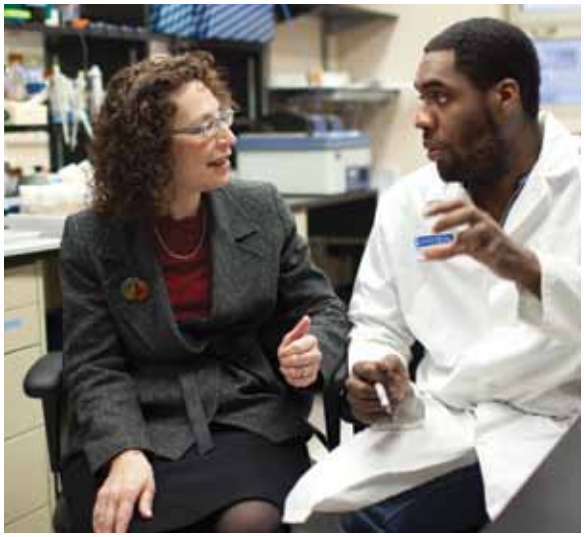
Dr. Fruhman's pedagogical talents were recognized at Einstein's 2009 Commencement, where he received the College of Medicine's Lifetime Achievement Award for Excellence in Teaching. He was a longstanding member of the Leo M. Davidoff Society, which honors teachers at Einstein who have made significant contributions to the education of students.

Another side of this quietly remarkable man was his joy in life and in learning, which touched everyone around him. Dr. Fruhman sought to encourage more of the best and brightest students to enroll at Einstein; his parting gift carefully stipulates that Einstein award Fruhman Scholarships to the most talented applicants each year.

This final gesture by Dr. Fruhman, intended to help students and to buoy the institution that played an integral role in his life, will surely have an amazing impact on the lives of students for generations to come. Einstein hopes to award the first of many Fruhman Scholarships in the fall of 2012.

CELEBRATING EINSTEIN'S NEW RESEARCH GENERATION

Happy Declaration Day. For grad students, laboratory declaration (choosing the laboratory where they'll do years of research leading to a doctorate) is huge. "A Ph.D. is awarded for something that no one has ever discovered before, and the process is hard," said Victoria H. Freedman, Ph.D., associate dean for graduate programs in the biomedical sciences, in her welcoming remarks. The momentous decision has traditionally gone unrecognized—until this June. Thanks to the student and educational affairs committee, chaired by Overseer Nathan Kahn, 54 grad students gathered in the Mary and Karl Robbins Auditorium for the first Declaration Celebration "recognizing our Ph.D. students, who have committed their futures to research," says Mr. Kahn. Gifts from Einstein Ph.D. alumni supported the event, which occurred amid bouquets of blue and white helium balloons.



Victoria Freedman, Ph.D., associate dean for graduate programs in the biomedical sciences, with Ph.D. student Jeremy Fagan.

Finding Answers in India. "Everything local is global, and everything global is local," says Sonia Suchday, Ph.D., director of the Summer Institute in Global Health, a program of Einstein's Center for Public Health Sciences. For the first time last summer in Mumbai, India, her medical and Ph.D. psychology students gathered information about social and behavioral aspects of health via interviews and questionnaires.

"Globally and locally, we must always consider family, cultures and context," says Dr. Suchday, associate clinical professor of epidemiology & population health at Einstein. For example, she notes that in Asia, obesity and malnutrition may coexist in the same family because of "food discrimination"—boys receiving more to eat than girls.

Tomorrow's Public Health Researchers. The Center for Public Health Sciences' new M.P.H.

Anthony Clarke, Class of 2012, Gold Humanism Honor Society awardee.

program "addresses health problems not patient by patient but on a broad scale," says the program's director, Cheryl Merzel, Dr.P.H., associate professor of clinical epidemiology & population health at Einstein. Seventeen students are now enrolled in the program, a number of whom are working on their practicums—fieldwork at places such as Urban Health Plan, a large South Bronx community health center. Students include doctors, dentists, nurses, other health professionals and med students. The first class will graduate this spring.

CUSTOM EDUCATION

Great minds don't always think alike. The Einstein faculty has long recognized that students have individual personalities as well as individual learning styles. So it made sense that in the summer of 2011, Nadine Katz, M.D. '87, senior associate dean for student academic affairs, and Stephen Baum, M.D., senior associate dean for students, started administering the Myers-Briggs personality test to incoming students. "Gaining a better understanding of themselves will help students work more easily with their classmates, future colleagues and medical teams and allow them to become more successful leaders," says Dr. Katz. "The test's results have even been shown to help med students choose their specialties and plan their residencies."

BIOETHICS MEDIATION

The recently created Einstein-Cardozo Master of Science in Bioethics program has added a mini-course on bioethics mediation, which can be taken for credit or independently. The four days of classes cover tools for managing and resolving conflict among patients, providers and families.

GOOD AS GOLD

To recognize M.D. students notable for their devotion to patient care, Einstein has opened a chapter of the Gold Humanism Honor Society. In September 2011, 19 students in the Class of 2012 (including Anthony Clarke, left) were inducted, as were five faculty members. Working with the Office of Student Affairs, Mimi McEvoy, M.A., R.N., assistant professor of pediatrics and co-director of the Introduction to Clinical Medicine course, was the driving force in bringing the chapter to Einstein. She's now a co-advisor with Ann Hanley, M.D., assistant professor in the Saul R. Korey Department of Neurology, and Staci Pollack, M.D., assistant professor of obstetrics & gynecology and women's health.

STUDENT PROFILE
ANTHONY CLARKE

In September 2011, the Gold Humanism Honor Society honored Anthony Clarke (Class of 2012) for his dedication to the advancement of medicine and compassionate care—qualities evident in his research fellowship in emergency ultrasonography and his volunteer work with various groups, including the Einstein Community Health Outreach (ECHO) clinic. The Jamaican transplant studied engineering and chemistry and then taught math before entering medicine. Now he has the impact on community health he always wanted.

"I think of myself as an advocate for the patient," says Clarke, who routinely goes the extra mile, even creating a workout program for an overweight teenager too shy to participate in sports. Emergency medicine is Clarke's intended specialty—a fitting choice for someone who loves snowboarding.

THE RUDIN FAMILY FOUNDATIONS

Since 1973, the Rudin family, owners of Rudin Management, one of New York City's leading real estate firms, has been committed to helping Einstein students fulfill their dreams of careers in medicine and biomedical research. Nearly a thousand Rudin Scholars at Einstein have benefited from the visionary philanthropy of this distinguished New York family.

The Rudins' longtime investment in the College of Medicine, through the Louis and Rachel Rudin Foundation and the May and Samuel Rudin Family Foundation, has helped train generations of highly skilled and compassionate doctors, physician-scientists and researchers while also helping fund critical biomedical research programs.

This past year, the Louis and Rachel Rudin Foundation provided medical school scholarships as well as support for Einstein's M.D./Ph.D. program, its Hispanic Center of Excellence and important training programs at Einstein and several of its affiliated teaching hospitals.

Jack Rudin, above, chair of the Rudin Family Foundations, was instrumental in establishing the Rudin Scholars Program at Einstein. (See the profile of a Rudin scholar at right.)

STUDENT PROFILE

BRIAN WENGERTER

One of the more than 1,000 Einstein students who can say "thank you" to Mr. Rudin is Brian Wengerter, who is doing thesis research in the laboratory of Steven C. Almo, Ph.D., professor of biochemistry and of physiology & biophysics. While applying to medical schools, Brian worked in a chemistry lab and became interested in medical research. Einstein's M.D./Ph.D. program was perfect for him. Today, Brian researches novel ways to activate the dendritic cells at the heart of the immune response to infectious disease and cancer. "Cancer is not a single disease but more than 100 different disease types," he says. "I hope to develop vaccine technology using a class of molecules called ribonucleic acid aptamers, which can be selected to bind to a desired target. Aptamers can also be synthesized more easily than the proteins now used for that purpose."

Tracy and Russell W. Cohen, M.D. '85, F.A.A.D.

Russell W. Cohen, M.D. '85, F.A.A.D., and his wife, Tracy, made a commitment that will help provide a state-of-the-art educational environment for training future generations of Einstein physicians. In recognition of the couple's generosity, an examination room in the Clinical Skills Center has been named in honor of their family. Dr. Cohen is a dermatologist in private practice in Oceanside, NY.

The Irma T. Hirschl Trust

The Irma T. Hirschl Trust, a longtime generous supporter of medical research and medical education at Einstein, this past year awarded grants totaling $706,200 to the College of Medicine. In planning her estate, Irma T. Hirschl, who had a heart condition and whose parents died of cancer, designated the major portion of her assets for basic medical research. Since the trust was established, it has provided Einstein with research grants totaling nearly $8 million and scholarship support of more than $1.8 million.

Sylvia Medzuck Trust

Einstein received a bequest of $147,808 from the estate of Sylvia Medzuck. The funds will be used for a scholarship fund in her name for female medical students at the College of Medicine who demonstrate financial need.

overcoming developmental disorders

transforming young lives

With support from distinguished friends of the College of Medicine, work proceeds toward relocating all five sites of the Children's Evaluation and Rehabilitation Center (CERC) within the Van Etten Building.

CERC researchers move into the new Cognitive Neurophysiology Laboratory supported by Einstein's National Women's Division, Daniel R. and Sheryl Tishman and a New York State grant.

The NIH awards Einstein researchers $5.7 million to fund the Rose F. Kennedy Intellectual and Developmental Disabilities Research Center.

LOOKING FOR GENES THAT CAUSE AUTISM

A long-standing fascination with how genes influence behavior led Brett S. Abrahams, Ph.D., to look for genes that contribute to autism spectrum disorders (ASDs), which affect an estimated one of every 110 children in the United States.

Dr. Abrahams has been recruiting ASD patients and their families to participate in this research. Using cutting-edge laboratory methods, he scours the genomes of these families to find genetic variants that increase risk for ASDs.

"We've made incredible progress," says Dr. Abrahams, who joined Einstein in 2010 as assistant professor of genetics. "Genes that we and others have identified have already found their way into the clinic." Identifying these genes, for example, has allowed physicians to test young ASD children to see if they're at risk for developing clinical complications such as epilepsy, and parents of an ASD child can be tested to learn whether ASDs are likely to occur in subsequent children.

When Dr. Abrahams does find a gene variant that seems to influence ASD risk, he manipulates the corresponding gene in mice to create an animal model of ASD. He and his colleagues study these mice to see how gene mutations alter brain structure, brain function and behavior.

"The behaviors we've seen in these animals—problems with vocal communication and social interaction as well as repetitive behaviors—are strikingly similar to the classic abnormalities observed in ASD kids," says Dr. Abrahams. "We've even found that risperidone—a drug known to help some ASD children—actually helps the mice as well.

"I realize how difficult things can be for families with a special-needs child," he adds. "Knowing that our work can potentially improve the quality of life for ASD kids and their families is the most gratifying aspect of this research."

Researchers at Einstein are seeking to transform the health of people with developmental and genetic disorders ranging from autism to rare genetic diseases. Working independently and in collaboration, they are changing the landscape of genetics research.

Brett Abrahams, Ph.D., assistant professor of genetics.

UNLOCKING THE SECRETS OF RARE GENETIC BRAIN DISEASES

Steven U. Walkley, D.V.M., Ph.D., above, has spent more than 30 years studying inherited diseases called lysosomal storage disorders (LSDs).

Tay-Sachs is the best known LSD, while others include Hurler, Gaucher and Niemann-Pick. LSDs typically affect children. Some are confined to wheelchairs; others are blind, deaf or mentally impaired; almost all die young. LSDs collectively affect 1 in 6,000 live births, making them one of the most common groups of genetic diseases.

LSDs occur when lipids or other compounds accumulate inside lysosomes—enzyme-filled, intracellular structures that act to break down and recycle compounds.

People with LSDs lack normally functioning lysosomes, so compounds build up in cells and eventually damage bone, soft tissue and the central nervous system. A key interest of Dr. Walkley's is understanding how LSDs damage brain cells.

Dr. Walkley and his colleagues are also leaders in developing LSD treatments. One—the drug miglustat—has been approved in Europe for treating Niemann-Pick Type C disease.

Dr. Walkley is professor in the Dominick P. Purpura Department of Neuroscience, professor of pathology and director of the Sidney Weisner Laboratory of Genetic Neurological Disease at Einstein's Rose F. Kennedy Intellectual and Developmental Disabilities Research Center. He also directs this center, where he leads a group of scientists and clinicians studying a wide range of brain disorders in children. The team's efforts were bolstered in 2011 when the NIH gave $5.7 million to fund the Kennedy Center.

"This grant allows us to intensify our research on LSDs, autism, seizures and other pediatric brain disorders, which we hope will lead to new treatments and improved care," says Dr. Walkley.

Autism Speaks

Autism Speaks awarded grants totaling $116,000 this past year to support the work of two Einstein investigators: Anna Francesconi, Ph.D., assistant professor in the Dominick P. Purpura Department of Neuroscience, for her research on Fragile X Syndrome; and Esther Berko, an M.D./Ph.D. candidate from the department of genetics working in the laboratory of John Greally, M.B., B.Ch., Ph.D., for her study of the molecular events underlying the increased risk of autism in children of older mothers.

Brownstone Family Foundation

Training the most competent and caring physicians is a cornerstone of the Einstein mission. The Brownstone Family Foundation, a longtime supporter of the College of Medicine, recently made a generous commitment to the Clinical Skills Center. The foundation's support will enhance the ability of future Einstein doctors and researchers to deliver high-quality, compassionate care. In recognition of this new commitment, an examination room in the new training center will be named in honor of the Brownstone family.

Doris and Marc Kolber Trust

Einstein received a generous bequest totaling nearly $991,400 from the estates of Doris and Marc Kolber. The funds will be used to support the renovation of a new area for computational genetics research that will be housed in the College of Medicine's Van Etten Building. Before their retirement in 1970, the Kolbers owned the New Diamond Point Pen Company, a New York–based manufacturer of fine writing instruments. They were supporters of many Jewish, educational and cultural causes.

"We fully expected to find dozens if not hundreds of papers, but we were astounded at how little hard evidence there was out there. We knew there was a lot of work to be done, and we were the people to do it."

OVERCOMING AUTISM'S DEFICITS

Our brains are constantly bombarded by sensations—everything we see, hear, feel, smell and taste. The brain's ability to process all this information, known as sensory integration, is crucially important for everyday living.

Einstein's John J. Foxe, Ph.D. '99, and his research partner, Sophie Molholm, Ph.D., are studying whether children with autism have trouble with sensory integration. If so, the resulting sensory overload may contribute to the repetitive behaviors, social isolation and other problems that these kids experience.

Dr. Foxe is a professor in the department of pediatrics and in the Dominick P. Purpura Department of Neuroscience, and Dr. Molholm is associate professor in those two departments as well as the Muriel and Harold Block Faculty Scholar in Mental Illness. The researchers have worked together for many years to understand the neurobiology of multisensory integration—how sight, sound and touch are knitted together in the brain.

In 2003, Drs. Foxe and Molholm decided to expand their research into autism, which was beginning to receive a lot of attention. "We fully expected to find dozens if not hundreds of papers on multisensory deficits and autism, but we were astounded at how little hard evidence there was out there," says Dr. Foxe. "We knew there was a lot of work to be done, and we were the people to do it."

With the help of generous funding from Einstein's National Women's Division, the duo were recruited to Einstein in 2010. They brought with them a $2.8 million NIH grant to study why autistic people have trouble processing sensory inputs. Dr. Foxe was also named the first full-time research director of CERC.

In 2010, Drs. Molholm and Foxe published a paper in *Autism Research* showing that ASD children do indeed have significant deficits in their ability to integrate sound and touch—providing the first scientific support for years of clinical and anecdotal observations.

The researchers are also studying how well children with autism interpret facial and lip movements while watching someone speak—a skill especially important, for example, when trying to understand a teacher in a noisy classroom.

"We are finding that even highly functioning autistic children don't effectively read visual facial cues to enhance speech perception," says Dr. Foxe. "While they tend to catch up by about age 13 or 14, these skills are lacking during the critical childhood years when communication and socialization skills are being learned."

CERC Research Director John Foxe, Ph.D. '99, confers with Sophie Molholm, Ph.D., associate professor of pediatrics.

DANIEL R. AND SHERYL TISHMAN: ADVANCING RESEARCH ON COMMUNICATION DISORDERS

Einstein Overseer Daniel R. Tishman and his wife, Sheryl, are noted New York philanthropists whose interests include medical research and the environment. The Tishmans have generously supported translational research at the College of Medicine and recently made a $1.8 million commitment toward research at the Children's Evaluation and Rehabilitation Center (CERC) into communication disorders such as dyslexia. The couple gave an additional $450,000 for the continued renovation of the Van Etten Building where CERC is now housed.

Having raised a child with dyslexia, the Tishmans are well acquainted with the neurological condition, which makes it hard for those affected to recognize, spell and decode written words. So the couple was intrigued when they learned of novel research at Einstein that might hold the key to new treatments to improve the lives of children and others with dyslexia and related disorders—and possibly lead to effective prevention strategies.

Einstein Overseer Daniel R. Tishman.

After meeting several times with Dr. Foxe, the Tishmans decided to provide financial resources to help move these efforts forward. "Dan and Sheryl have sharp analytical minds and asked a lot of smart questions," recalls Dr. Foxe. "We're very grateful for their support and see them as our partners in this work.

"There is a massive need to advance our understanding of speech-language deficits in young children," notes Dr. Foxe. "We aim to develop effective measures for early detection of deficits in infants and toddlers, to understand the predisposing genetic factors and to develop early clinical interventions."

Using MRI technology, the researchers are studying the brains of infants, toddlers, adolescents and adults who have or are predisposed to dyslexia and other communication disorders. Driving their investigations is the question: Are the brains of dyslexic people wired differently from the brains of typically developing individuals?

Steve Caravella, M.A., a consultant therapist, working with children at CERC.

Dr. Foxe's research wing includes the Human Clinical Phenotyping Core directed by Dr. Molholm. This core maintains a registry of children with developmental disabilities who, with their parents' consent, are available to participate in clinical studies aimed at revealing the underlying causes of these conditions.

"Sheryl and I have confidence in Drs. Foxe and Molholm," says Mr. Tishman. "They're doing important work, and we are pleased to invest in helping them succeed."

In recognition of the Tishmans' vision and generosity, Einstein has named the wing in Van Etten that serves as home base to Drs. Foxe

"Drs. Foxe and Molholm are doing important work, and we are pleased to invest in helping them succeed."

and Molholm the Sheryl and Daniel R. Tishman Cognitive Neurophysiology Laboratory.

Mr. Tishman is chairman of Tishman Construction Corporation AECOM Construction Services, a leading New York–based real estate development and construction firm founded by his great-grandfather. He currently chairs the Natural Resources Defense Council, another organization that he and Mrs. Tishman passionately support.

A strong proponent of environmentally sustainable building practices, Mr. Tishman first became familiar with Einstein as an advisor on the construction of the Michael F. Price Center for Genetic and Translational Medicine/Harold and Muriel Block Research Pavilion. But it was the excellence of research and education at Einstein that motivated him to become personally involved.

In 2003, the Einstein Men's Division honored Mr. Tishman for his steadfast support of the College of Medicine and his many other charitable endeavors. Elected to the Einstein Board the following year, he has chaired the Board's nominating committee, sits on the executive committee and serves as secretary.

"As someone who has long been interested in science and biomedical research," says Mr. Tishman, "I continue to be inspired by the College of Medicine and its mission, and I am proud to serve on the Board."

VAN ETTEN PROJECT MOVES AHEAD THANKS TO EINSTEIN FRIENDS AND OVERSEERS

Distinguished supporters are helping the College of Medicine achieve an essential goal for future growth: the renovation of the Van Etten Building.

When Einstein obtained Van Etten from Jacobi/Bronx Municipal Medical Center in 2007, the acquisition fit perfectly into Einstein's master plan for developing its Jack and Pearl Resnick Campus. In the months and years to come, Van Etten will become home to clinical, educational and computational facilities now housed in other locations. These strategic moves will free up needed laboratory space.

The renovation's initial phase was completed in fall 2009, with the opening of the Clinical Skills Center. Since then, relocating CERC to Van Etten—along with elements of aging research and a variety of educational programs—has been the project's primary focus.

Thanks to generous investments from people such as Einstein Overseer Michael F. Price, the goal of providing a new home for CERC's dental clinic, infant and preschool program, developmental family services, children's hearing unit, adolescent unit and shared services in Van Etten is nearing completion. Mr. Price is a leading supporter of translational research and clinical programs at the College of Medicine. He and his wife, Jennifer, made a significant commitment that enabled the renovation of a number of the elements of CERC, and those programs will soon begin moving from their current sites to Van Etten.

A major commitment from Overseer Arnold Penner and his wife, Madaleine Berley, is also instrumental to CERC's plans. Mr. Penner has served on the Board of Overseers since 1998. He received the Einstein Lifetime Leadership Award in 2011 and is a past recipient of the Einstein Humanitarian Award.

The consolidation of CERC's various programs and services within Van Etten has also been expedited by Overseer Daniel Tishman and his wife, Sheryl. The Tishmans have contributed generously toward the work of CERC Research Director Dr. John Foxe, and have helped support construction within Dr. Foxe's research wing in Van Etten, as well as in clinical areas of CERC now based in the building.

Nathan Kahn, an alumnus of Yeshiva College who was elected to the Einstein Board in 2006, has been a strong supporter of medical education and currently chairs the student and educational affairs committee. He and his wife, Sandra, made an unrestricted pledge a few years ago. When they became aware of the Van Etten project's high priority, they graciously allowed Einstein to direct their support toward the construction of research space in Van Etten for investigators studying the human aging process.

NEW TO EINSTEIN

SPECIAL GENES FOR SPECIAL POPULATIONS

Harry Ostrer, M.D., below, was recently recruited from New York University School of Medicine. His positions at Einstein—professor of pathology, genetics and pediatrics—reflect his main research goals: "I want to understand the genetic risk factors for disease and apply that knowledge to developing tests that can help children and adults."

One focus of his work is the genetics of Jews and Hispanics/Latinos. "We'll be sequencing their genomes to understand the genetic risks in these populations," says Dr. Ostrer, who also directs genetics and genomic testing at Montefiore. For example, he's investigating the genetic susceptibility of Ashkenazi Jews to breast and prostate cancers. Dr. Ostrer also studies disorders of sexual development—girls, for example, who are born with an X and a Y chromosome (instead of the usual two Xs) yet develop physically as females.

Bernice Morrow, Ph.D., left, professor of genetics, with Raquel Castellanos, a Ph.D. student.

FOCUSING ON CHILDREN'S HEART DEFECTS

The NIH recently awarded Bernice Morrow, Ph.D., a five-year, $6.7 million grant to study the genetics of congenital heart abnormalities known as conotruncal defects (CTDs). Dr. Morrow is the Sidney L. and Miriam K. Olson Chair in Cardiology, the director of translational genetics and professor of genetics at Einstein.

Each year in the United States, nine of every 1,000 children—about 36,000 in all—are born with heart defects, and CTDs account for more than one-third of the cases. They can involve a faulty connection between the heart's chambers or an abnormality affecting the major blood vessels leaving the heart.

"We hope that this project will greatly expand our understanding of the genetic basis of CTDs and lead to novel therapies and preventive strategies," says Dr. Morrow, who is also a professor of obstetrics & gynecology and women's health and of pediatrics (cardiology).

The first part of Dr. Morrow's study will examine CTDs in patients with velo-cardio-facial/DiGeorge syndrome, also called 22q11.2 deletion syndrome (22q11DS). It is caused by the deletion of a small piece of chromosome 22 known as q11.2. This deletion, present in about one in every 4,000 live births, can cause a variety of developmental abnormalities in addition to CTDs.

Since the symptoms of 22q11DS vary from mild to serious, Dr. Morrow believes that DNA variations in other genes may influence disease severity. She and her team will also examine whether genes involved in 22q11DS play a role in more-common CTDs.

Robin Hood

Robin Hood identifies and funds the most effective programs targeting the root causes of poverty in New York City. In 2011, Robin Hood renewed its support for Einstein's Center for Babies, Toddlers and Families (CBTF) with a generous new commitment of $500,000.

The CBTF is a division of the Early Childhood Center at Einstein's Children's Evaluation and Rehabilitation Center and is directed by Susan Chinitz, Psy.D., professor of clinical pediatrics and the Patricia T. and Charles S. Raizen Distinguished Scholar in Pediatrics. The CBTF treats the causes of emotional distress in young children and their parents from underserved communities in the Bronx.

"Robin Hood has been an invaluable partner in so many ways," said Dr. Chinitz. "Above and beyond their generous financial support, they demonstrate their caring and concern for the children and families we serve. They also provide us with the tools to continually improve our clinical services, program evaluation and goal setting."

In 2010, Robin Hood awarded a renewal grant of $465,000 to the CBTF, attaining Benefactor status, an honored designation given to Einstein donors whose cumulative support has reached or exceeded $1 million.

"We are proud to partner with Einstein in helping this outstanding program continue its work in providing the youngest and most vulnerable New Yorkers with the resources they need to survive and thrive," said David Saltzman, executive director of Robin Hood.

Below, Susan Chinitz, Psy.D., professor of clinical pediatrics, with a young client.

Public Support for Einstein's New Cognitive Neurophysiology Lab

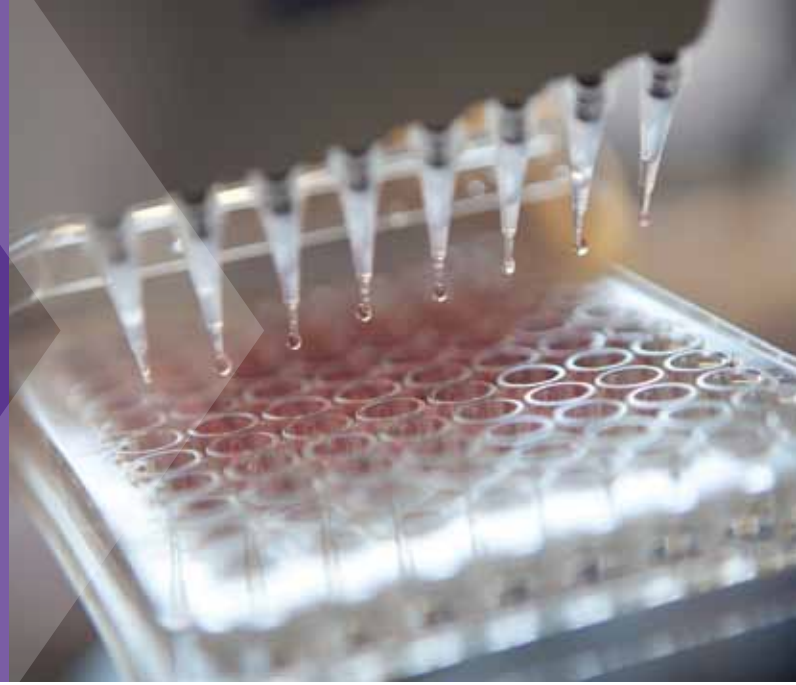
New York State Senator Jeffrey D. Klein, center, joined Einstein administrators and faculty members in November 2011 to open their new Cognitive Neurophysiology Laboratory. High-tech diagnostic and monitoring equipment were purchased through a $1 million capital grant that Senator Klein secured for Einstein. The lab also received support from Einstein's National Women's Division and was named for Overseer Daniel R. Tishman and his wife, Sheryl.

NYC Council Member James Vacca Helps Bring Advanced MRI Technology to Einstein

On December 16, 2011, Einstein welcomed City Council member James Vacca, center, at a special event recognizing his efforts to secure for the College of Medicine $2 million to support the purchase of new MRI equipment for the Gruss Magnetic Resonance Research Center.

spurring discoveries into drugs

faster access to new therapies



It currently takes an average of 13 years for a compound discovered through basic research to make it onto the pharmacy shelf.

In fall 2011, the National Institutes of Health created a new center—the National Center for Advancing Translational Sciences—to accelerate drug development.

Therapies now exist for only 200 of the approximately 4,000 disease conditions for which researchers have identified the precise molecular cause.

Einstein's proposed Center for Molecular Therapeutics and Drug Discovery will propel the College of Medicine's discoveries more quickly from bench to bedside. And with drug companies cutting back on research and development, the center will help ensure that new drugs continue to become available to benefit society.

HELPING TO CLOSE THE DRUG GAP

For much of her career, Anne R. Bresnick, Ph.D., professor of biochemistry, has been studying how cells move. Her aim: to stop cancer cells in a primary tumor from exiting and then seeding new growths at distant sites. That fateful migration, called metastasis, causes 90 percent of cancer deaths, and halting it is one of the great challenges of medicine.

In 2000 Dr. Bresnick became interested in a protein called S100A4, which is plentiful in tumor cells that wander off but scarce in those that stay put. She reasoned that S100A4 might be causing tumor cells to become motile and that targeting it with drugs could be a novel approach for preventing metastasis. Dr. Bresnick soon demonstrated that S100A4 controls the protein filaments within cells that help them move—proof that S100A4 is directly linked to the cell movement essential for cancer metastasis.

As important as this discovery was, Dr. Bresnick's S100A4 work is far from over. Now she's searching for a compound that can inhibit S100A4 in cancer cells—hobbling their movement while leaving normal cells relatively unscathed. Then comes the task of tweaking that compound's molecular structure to maximize its safety and effectiveness and, finally, testing it in animals. If all goes well—a big "if" in this uncertain business—her drug targeting S100A4 could be ready for clinical trials in a decade.

In years past, Einstein's Office of Biotechnology and Business Development might have licensed Dr. Bresnick's finding to a pharmaceutical

Anne Bresnick, Ph.D., right, professor of biochemistry, with Natasha Dulyaninova, an associate in the department of biochemistry.

"Pharmaceutical companies traditionally focus on drugs that can earn billions of dollars a year," says Dr. Schramm. "We at Einstein have more altruistic goals."

company, which would have finished the research and development effort. But for the most part, that's not how drugs are developed today.

Faced with rising costs and dwindling profits, pharmaceutical companies are scaling back on research and development—and expecting more from academe. The reason is understandable. Out of every 5,000 compounds screened for their potential to become drugs, only 250 progress from laboratory to animal testing, and just one wins U.S. Food and Drug Administration (FDA) approval. On average, it takes 13 years and one billion dollars to bring a drug to market. So in these uncertain economic times, it's no surprise that drug makers are skittish about buying up experimental drugs, no matter how promising.

"Before investing hundreds of millions of dollars in developing a particular drug, pharmaceutical companies now want proof of concept," says Vern Schramm, Ph.D., professor and chair of the department of biochemistry and the Ruth Merns Chair in Biochemistry. "Our responsibility here at Einstein is to provide that proof—which means that we have to push our discoveries further along in the drug-development pipeline than we've done before."

Academic researchers such as Dr. Bresnick need help carrying out those additional tasks. "Each step in drug development requires a unique set of tools and expertise, and not having those capabilities here at Einstein has been a problem. For example, our lab is pretty good at developing assays to screen for compounds that can hit our S100A4 target," says Dr. Bresnick. "We've had some initial hits that were fantastic in vitro but turned out to be toxic in vivo. Your lead compound—the one you first develop—never proves to be your optimal compound. For that, you need medicinal chemists who can work with you to improve the drug—to lessen its toxicity, lengthen its half-life or boost its potency, for example."

Such barriers to pursuing their drug discoveries help explain why Einstein researchers typically license those discoveries soon after making them. But handing them off so early in the drug-development process means that Einstein misses out on a large part of future profits if the drug is ever approved for sale.

NEW RESOURCE FOR EINSTEIN RESEARCHERS

To help develop promising discoveries into useful drugs, Allen M. Spiegel, M.D., the Marilyn and Stanley M. Katz Dean, saw the need to create the Center for Molecular Therapeutics and Drug Discovery at Einstein. The center is a vital component of Einstein's updated strategic research plan.

Vern Schramm, Ph.D., professor and chair of biochemistry, with postdoctoral fellow Hongling Yuan.

"Our goal is not to become a drug company or to compete with the private sector," says Dr. Spiegel. "Instead, we want to take on a larger role in translating Einstein's discoveries into solutions for improving human health. And to do that, we have to make our discoveries more attractive for licensing by pharmaceutical or biotech companies. In addition, carrying out more of the drug development here at Einstein should result in greater financial returns."

If all goes according to plan, the new center will provide the Einstein research community with resources to screen for compounds, design drugs, create animal disease models, conduct pharmacokinetic studies and file investigational new-drug applications—key steps in translational research.

To further the work of the Einstein research community, the center will offer the following "enabling technologies" and the experts to run them: computational chemistry and drug design; fragment and library screening; chemical access and optimization; and pharmacokinetics and metabolomics. (See sidebar at right for descriptions.)

Dr. Schramm hopes that the center will also boost the development of drugs for diseases such as tuberculosis and malaria—largely neglected by the drug industry because they mainly affect poorer countries.

"Pharmaceutical companies traditionally focus on drugs that can earn billions of dollars a year," says Dr. Schramm. "The problems they target—such as baldness and sexual dysfunction—are often not the most important in terms of human health and welfare. We at Einstein have more altruistic goals."

In addition, the new center will offer Einstein scientists more opportunities to participate in early clinical trials. "These would not be full-scale FDA-approved clinical trials, which cost up to $100 million and therefore must be conducted by pharmaceutical companies," notes Edward R. Burns, M.D. '76, executive dean and professor of pathology and of medicine (hematology). "But working with our clinical partners at Montefiore Medical Center, we could do small-scale, first-into-human studies to obtain proof of concept, preliminary evidence of a drug's efficacy. This would allow us to license intellectual property at a much higher level and thereby benefit financially."

Better therapies are urgently needed to improve human health worldwide. The Center for Molecular Therapeutics and Drug Discovery will play a vital role in bringing Einstein's discoveries from the lab benches of its researchers to the bedsides of people who need them.

FOUR TECHNOLOGIES FOR NEW DRUGS

Einstein's new drug discovery center will provide four key technologies:

Computational chemistry and drug design: Say you've discovered a promising drug target: a receptor protein that transmits messages telling cells to divide uncontrollably. Experts using powerful computers can determine your target's three-dimensional structure and then design a drug that precisely binds to and inactivates it.

Fragment and library screening: Another way to find the right drug is to test lots of them against your target and look for "hits" (i.e., drugs that inactivate the target). With use of high-throughput screening, thousands of candidate drugs can be tested against the target in a single day. Libraries are large collections of compounds and fragments of compounds housed in medical centers and drug companies.

Chemical access and optimization: All too often, a compound that initially shows promise against a drug target proves less than ideal on further testing. But by tweaking the molecule—removing a methyl group here or adding a butyl group there, for example—experts can produce a new and improved version that does the job.

Pharmacokinetics and metabolomics: A key aspect of drug testing involves pharmacokinetics—assessing what the body does to the drug and what the drug does to the body. A drug that appears "safe" could change into a toxic metabolite once the drug is given. (A metabolite is any substance produced during metabolism.) Metabolomics involves measuring blood and tissue metabolites (glucose, for example) to evaluate a drug's effects on normal metabolism.

halting cancer's deadly spread

focus on metastatic disease

Jeffrey Pollard, Ph.D., receives the Medal of Honor in Basic Science from the American Cancer Society for his tumor microenvironment research.

Susan Band Horwitz, Ph.D., receives an Award for Lifetime Achievement in Cancer Research from the American Association for Cancer Research for her work on Taxol.

Roman Perez-Soler, M.D., and Yiyu Zou, Ph.D., receive a $2.4 million NIH grant to develop an inhaled therapy for lung cancer.

HOW IMMUNE CELLS SPREAD CANCER

For every million cells that a primary tumor sheds, just one might successfully establish the cancer at a distant site. Jeffrey W. Pollard, Ph.D., professor of developmental and molecular biology and of obstetrics & gynecology and women's health at Einstein, has shown that the sequence of events involved in metastasis is highly orchestrated. Now his research is directed toward what so far has never been attained: an effective therapy for metastatic cancer.

Dr. Pollard studies the tumor microenvironment—the mélange of normal cells (e.g., fibroblasts and macrophages), proteins and other molecules that surround and communicate with tumor cells, helping influence tumors to become metastatic. Through a series of important papers that delve into the tumor microenvironment, Dr. Pollard has changed how science views the immune system's role—and the role of immune cells called macrophages in particular—in the spread of cancer.

Macrophages are best known for protecting the body against disease-causing microbes. And since macrophages tend to congregate near aggressive tumors, they were also thought to combat cancer by recognizing cancer cells as foreign and then attacking them.

"But we had the idea that instead of macrophages being there to reject the tumor, they were actually being enlisted by the tumor to promote cancer spread," says Dr. Pollard, who holds the Louis Goldstein Swan Chair in Women's Cancer Research and is deputy director of the Albert Einstein Cancer Center.

Jeffrey Pollard, Ph.D., professor of developmental and molecular biology.

Einstein researchers are trying to prevent tumors from seeding themselves throughout the body in the process of metastasis—the major cause of cancer deaths. That means interrupting signals among cells in the tumor microenvironment that facilitate the movement of cancer cells and their ability to penetrate blood vessels.

A 2011 study that Dr. Pollard published in *Nature* has shed light on a key step in metastasis, known as extravasation, in which cancer cells that have penetrated blood vessels then invade tissues. There they form satellite metastatic tumors.

Using an animal model of breast cancer, Dr. Pollard found that blood-borne cancer cells in the lung synthesize a molecule called CCL2 that could be an inviting target for antimetastatic therapy. Macrophages lured by CCL2 stimulate extravasation, which allows tumor cells to invade lung tissue.

"In human breast cancer, CCL2 expression is associated with poor prognosis and metastatic disease," says Dr. Pollard. "So by inhibiting CCL2 signaling, we might be able to stop breast cancer from spreading to the lung."

Dr. Pollard has now extended his research to bone metastases (bone is the most common place for breast cancer to spread) and found that similar mechanisms are operating. In collaboration with Paul S. Frenette, M.D., he is studying how macrophages in bone marrow influence the seeding of tumor cells, raising the exciting possibility of preventing metastatic cells from getting established in bone. "The goal," says Dr. Pollard, "is to develop novel targeted therapies that will prevent breast cancer from spreading anywhere in the body."

THE STEM CELL CONNECTION

Dr. Frenette, professor of medicine (hematology) and of cell biology, and director of the Ruth L. and David S. Gottesman Institute for Stem Cell and Regenerative Medicine at Einstein, studies metastases arising from a different tumor site—the prostate—and the nervous system's role in fueling the process.

Dr. Frenette, above, is an authority on hematopoietic stem cells, which form all the cells of the blood. They reside in microscopic niches in the bone marrow until prompted to leave and enter the bloodstream, where they circulate and populate other niches. In 2006, Dr. Frenette and colleagues reported that signals from the sympathetic nervous system play a critical role in controlling the egress of hematopoietic stem cells from bone marrow. That led him to wonder if nerves might also stimulate tumor cells to exit from their primary site—the critical initial step in metastasis.

Previous studies suggested that solid tumors, including breast, lung and prostate tumors, contain a small population of cells referred to as cancer stem cells. They behave much like "normal" stem cells (able to differentiate into various cell types and renew themselves, for example) but use those abilities to generate new metastatic tumors.

"It's interesting to note that in prostate cancer patients, the gland's increased invasion by nerves is associated with metastasis," says Dr. Frenette.

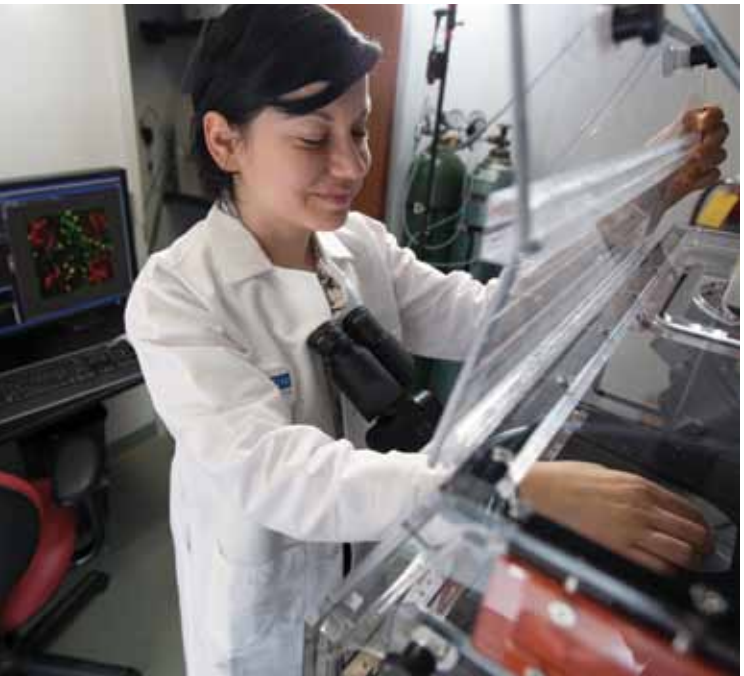
The parallels between hematopoietic stem cells and prostate cancer stem cells don't end with nerve fibers. Dr. Frenette has shown that nerve signals control the motility of hematopoietic cells by regulating bone-marrow levels of CXCL12—a chemical also found in prostate tumors. And CXCL12, depending on its level, suppresses or activates stem cell motility by interacting with CXCR4—a receptor on the surface of both hematopoietic stem cells and prostate cancer stem cells. "Our hypothesis," says Dr. Frenette, "is that a similar mechanism governs both hematopoietic stem cell mobilization and cancer cell migration in metastasis. If we're correct, then drugs that modify sympathetic nerve activity might help to reduce or prevent cancer metastasis."

He and his colleagues are now testing that hypothesis in studies involving a mouse model of prostate cancer and human prostate cancer tissue.

PROFILE

BOJANA GLIGORIJEVIC, PH.D.

As a child in Belgrade, Bojana Gligorijevic, Ph.D., below, was inspired by the famed Yugoslavian inventor Nikola Tesla and by ancient alchemists: She wanted to apply the mysteries of science to change the world. At Einstein, the 2010 Dennis Shields Prize winner combines her twin passions of science and art. Working with advisor John S. Condeelis, Ph.D., professor and co-chair of the department of anatomy and structural biology and co-director of the Gruss Lipper Biophotonics Center, she makes color "movies" of tumor microenvironments using multiphoton microscopy techniques. In a paper published in *Nature Methods* in December 2008, she reported on the movement of single breast tumor cells in living mice over the course of several days. By tagging tumor cells with fluorescent proteins, Dr. Gligorijevic observed tumor cells as they became metastatic and invaded the surrounding microenvironment, including nearby blood vessels. "I've also presented my science data as esthetic artifacts," says Dr. Gligorijevic. "In Brooklyn's A.I.R. Gallery, I exhibited a micrograph showing an erythrocyte—a red blood cell—floating in a blood vessel."

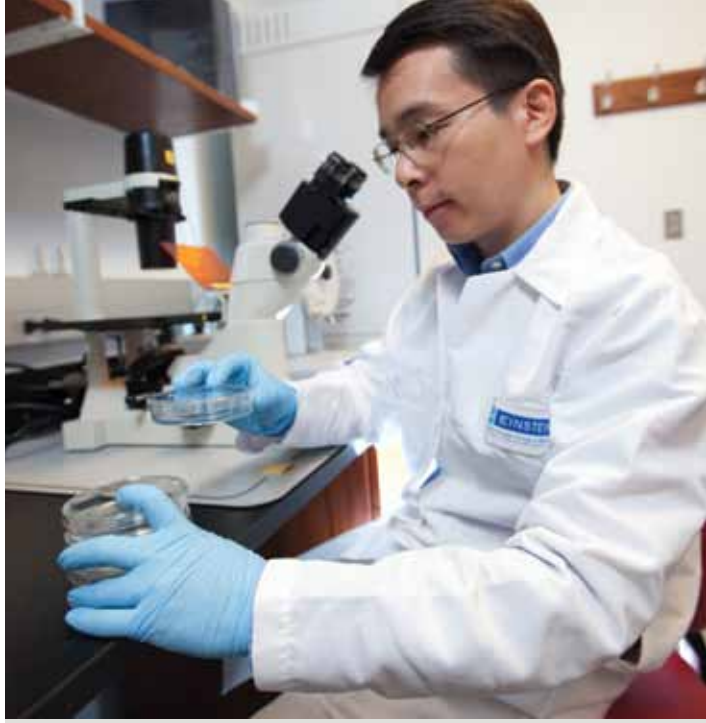


Sidney Kimmel Foundation for Cancer Research

Matthew J. Gamble, Ph.D., assistant professor of molecular pharmacology, was one of 15 U.S. scientists selected by the Sidney Kimmel Foundation for Cancer Research to receive a $200,000 Kimmel Scholar Award in 2010. Dr. Gamble is exploring two families of proteins that interact abnormally in cancer, leading to increased cell division—innovative research that could lead to more targeted drug treatments. The prestigious Kimmel Scholar Program was created in 1997 to advance the careers of promising young scientists involved in cancer research.

Greater New York City Affiliate of Susan G. Komen for the Cure

The Greater New York City Affiliate of Susan G. Komen for the Cure (Komen Greater NYC) awarded a grant of $87,020 to the Bronx Breast Oncology Living Daily (B.BOLD) Program at Einstein. Under the direction of Alyson B. Moadel, Ph.D., associate professor of clinical epidemiology & population health and head of the Psychosocial Oncology Program at the Albert Einstein Cancer Center, B.BOLD offers a wide range of free wellness workshops for people living with cancer, and their family members. This is the second grant that the program has received from Komen Greater NYC.



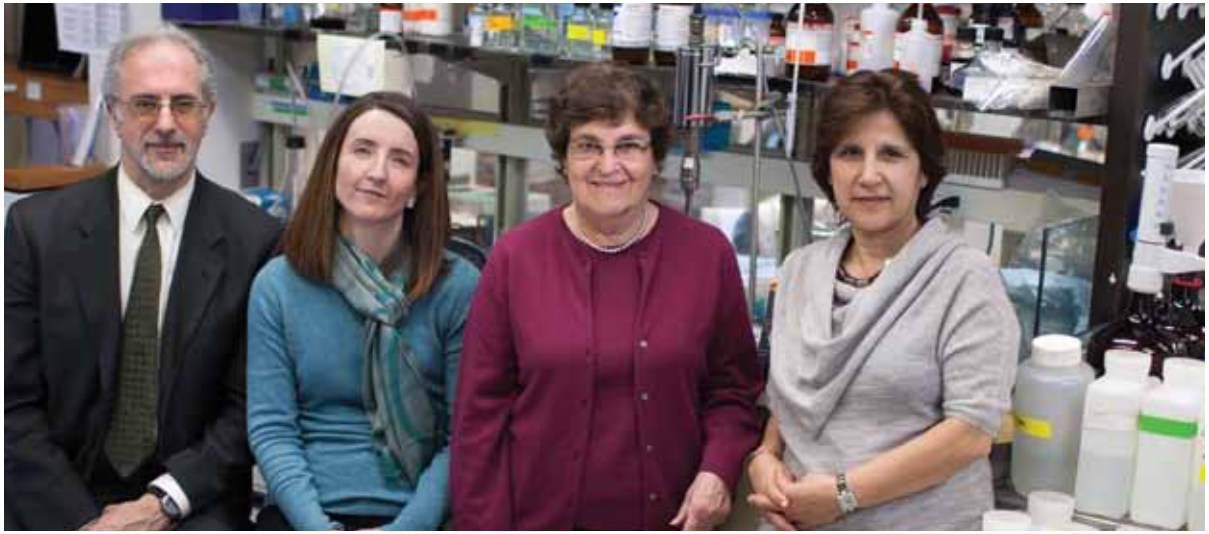
NEW TO EINSTEIN

WENJUN GUO, PH.D., AND KEISUKE ITO, M.D., PH.D.

Recently, Dr. Frenette recruited two experts on cancer stem cell biology to Einstein. Wenjun Guo, Ph.D., above, from the Whitehead Institute for Biomedical Research, studies the molecular mechanisms that control whether stem cells in mammary tissues remain dormant, multiply or differentiate into various other types of cells. Dr. Guo came to Einstein in 2011 as an assistant professor of cell biology.

Keisuke Ito, M.D., Ph.D., from Harvard Medical School, studies the role of highly reactive chemicals called free radicals in stem cell aging. He arrived on campus in 2012 as an assistant professor of cell biology.

Both researchers are members of the Albert Einstein Cancer Center.



BCRF awardees, from left: Thomas Rohan, M.D., Ph.D.; Hayley McDaid, Ph.D.; Susan Band Horwitz, Ph.D.; and Rachel Hazan, Ph.D.

The Breast Cancer Research Foundation

The Breast Cancer Research Foundation (BCRF) funds novel clinical and translational research at leading medical centers worldwide. BCRF has generously supported the work of Einstein researchers since 2006, and this past year renewed its commitment with three grants totaling $675,000. The grants continue BCRF's support for studies by Susan Band Horwitz, Ph.D., the Rose C. Falkenstein Chair in Cancer Research and distinguished professor and co-chair in the department of molecular pharmacology, with Hayley M. McDaid, Ph.D., assistant professor of medicine (oncology); by Rachel Hazan, Ph.D., associate professor of pathology; and by Thomas E. Rohan, M.D., Ph.D., professor and chair, department of epidemiology & population health, and the Atran Foundation Chair in Social Medicine.

Drs. Horwitz, McDaid, Hazan and Rohan attended the 2011 BCRF Symposium and Awards Luncheon at the Waldorf=Astoria. Just weeks later, the Einstein community was saddened to learn of the death of Evelyn H. Lauder, founder and chairman of BCRF. "Mrs. Lauder will be remembered for her pioneering role in advancing the worldwide effort to prevent and treat breast cancer. The Breast Cancer Research Foundation's steadfast support for research at Einstein is part of her legacy," said Allen M. Spiegel, M.D., the Marilyn and Stanley M. Katz Dean.

BCRF has now awarded a total of $3,556,231 to Einstein investigators. In recognition of its generosity, the foundation has attained Benefactor status, an honor bestowed on donors who have contributed $1 million or more in support of the College of Medicine.

Bill & Melinda Gates Foundation

The Bill & Melinda Gates Foundation awarded a $100,000 grant from its Grand Challenges Explorations Initiative (GCE) to Arturo Casadevall, M.D., Ph.D., and Ekaterina Dadachova, Ph.D., for their research on the use of radioimmunotherapy to treat HIV/AIDS. "GCE winners are expanding the pipeline of ideas for serious global health and development challenges where creative thinking is most urgently needed. These grants are meant to spur on new discoveries that could ultimately save millions of lives," said Chris Wilson, director of Global Health Discovery at the Bill & Melinda Gates Foundation. Dr. Casadevall is the Leo and Julia Forchheimer Chair in Microbiology and Immunology and professor and chair of the department, and professor of medicine (infectious diseases). Dr. Dadachova is the Sylvia and Robert S. Olnick Faculty Scholar in Cancer Research and professor of nuclear medicine and of microbiology & immunology. This is the foundation's second grant to Albert Einstein College of Medicine.

The New York Community Trust

The New York Community Trust has awarded a grant of $135,000 to Richard G. Gorlick, M.D., vice chair of the department of pediatrics and professor of pediatrics (hematology/oncology) and of molecular pharmacology, to support his research aimed at improving the treatment of bone cancer in children.

Martin and Janet Spatz.

THE HELEN AND IRVING SPATZ FOUNDATION

A crucial phase of biomedical research involves conducting clinical trials. At Einstein, that task is now much easier thanks to the Helen and Irving Spatz Foundation, which made a commitment of $1 million to support clinical trials in cancer.

"We have a unique opportunity to create a powerful clinical research enterprise, and enhancing our clinical trials capacity is a critical component of this goal," says Allen M. Spiegel, M.D., the Marilyn and Stanley M. Katz Dean. "I am very grateful to the Spatz Foundation for its decision to support this extremely important aspect of cancer research. The foundation's generous and farsighted investment will help our investigators advance in their efforts to find better treatments for cancer."

"My husband, Martin, and I are very interested in cancer research and excited about Einstein's work in this area," says Janet Spatz, a director of the foundation. "When we met with Dean Spiegel and heard about the plans for expanding the clinical trials program at Einstein, we were very impressed and wanted to help."

A previous gift of $1 million from the Helen and Irving Spatz Foundation established the Spatz Family Laboratory for Cancer Research in memory of Helen and Irving Spatz and Helen and Joseph Alintoff in the Michael F. Price Center for Genetic and Translational Medicine/ Harold and Muriel Block Research Pavilion at Einstein. Mr. Spatz's late parents, Helen and Irving Spatz, were Benefactors of Yeshiva University.

EINSTEIN'S NATIONAL WOMEN'S DIVISION: SUPPORTING RESEARCH ON WOMEN'S CANCERS

Since its founding in 1953—two years before Albert Einstein College of Medicine opened its doors—the National Women's Division has been dedicated to advancing the medical school's mission to improve human health.

Over the years, Women's Division members have contributed their time and talents to projects that have raised millions to support medical research and education programs at Einstein.

The division's current initiative helps fund research on women's health and cancers at the Albert Einstein Cancer Center. These collaborative studies by leading scientists aim to pave the way for innovative drug therapies and prevention strategies for breast, ovarian, cervical and uterine cancers.

Highlights of this year's fundraising efforts included the 57th annual Spirit of Achievement Luncheon and Family Day in the Hamptons.

For more about Einstein's National Women's Division, please turn to page 53.

Einstein National Women's Division leaders, top photo: Tara Stein, president, Westchester/Fairfield chapter; Kathy K. Weinberg, president, National Women's Division; bottom photo: Mara Sandler and Mindy Feinberg, co-presidents, New York chapter.

tackling the number-one killer

healing hearts, molecule by molecule

Einstein commits to improving heart health by undertaking multidisciplinary research and moving new discoveries into practice.

Einstein confirms its commitment to heart health by establishing the Wilf Family Cardiovascular Research Institute under the direction of Richard N. Kitsis, M.D.

Einstein recruits heart imaging specialist Mario J. Garcia, M.D., cardiac injury authority Nikolaos G. Frangogiannis, M.D., and structural biologist and drug-design expert Evripidis Gavathiotis, Ph.D.

Einstein aims to make cardiovascular disease—damage to the heart and its blood vessels—much less common.

Cardiovascular disease poses one of the toughest challenges in medicine. What predisposes us to it? What triggers heart attacks and strokes, and why do those events launch a downward spiral that leads to premature death, and a poor quality of life for survivors? How can we prevent this damage?

Trying to answer those questions are Richard N. Kitsis, M.D., director of Einstein's Wilf Family Cardiovascular Research Institute and the Dr. Gerald and Myra Dorros Chair in Cardiovascular Disease, and his team of basic scientists, practicing cardiologists, imaging experts and surgeons. They address every aspect of cardiovascular disease, from the earliest disease processes to experimental molecules that could become interventional drugs. Standing ready is a clinical setting for evaluating such drugs: the Montefiore Einstein Center for Heart and Vascular Care (co-directors Mario J. Garcia, M.D., and Robert E. Michler, M.D.) and the Pediatric Heart Center at The Children's Hospital at Montefiore (co-directors Daphne Hsu, M.D., and François Lacour-Gayet, M.D.).

STARING DOWN CELL DEATH

In a heart attack, a coronary artery becomes blocked and heart muscle is deprived of oxygen, usually resulting in the death of heart muscle cells. Dr. Kitsis and his colleague Evripidis Gavathiotis, Ph.D. (see next page), are uncovering the sequence of molecular events that leads to cell death. Necrosis and apoptosis—the best known forms of cell death—destroy heart muscle during a heart attack and brain tissue during a stroke.

Dr. Kitsis, professor of medicine (cardiology) and of cell biology, has long studied how a heart attack damages heart tissue. His goal is "to make a drug that can be used in the early hours of myocardial infarction to interrupt cell death and minimize damage to the heart muscle," he says. Thanks to a recent National Institutes of Health grant, Dr. Kitsis designed a project (a robotically executed "high-throughput screen") for rapidly assessing more than 500,000 chemicals to find

At right, above:
Richard N. Kitsis, M.D., professor of medicine (cardiology).

"Healing hearts without scarring is a critical goal of cardiovascular research."

those that can block cell death after heart attacks and strokes.

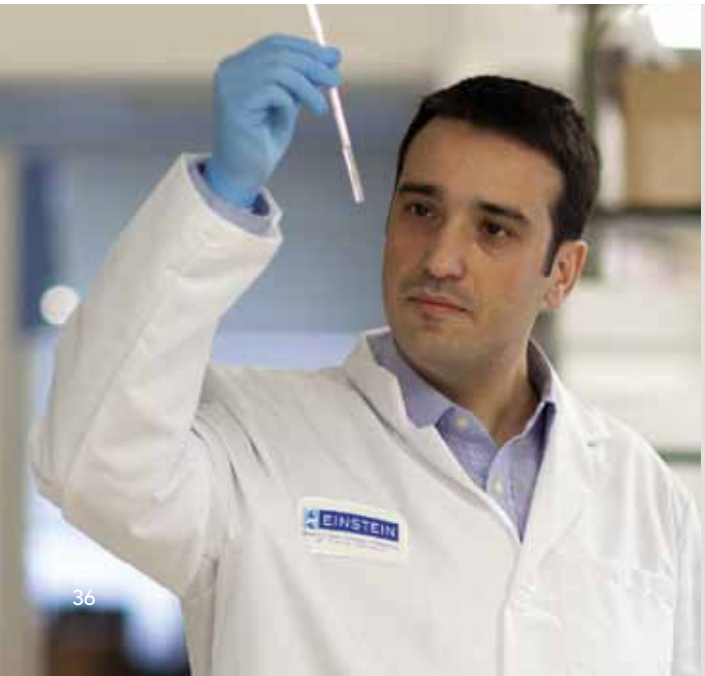
The screening has already revealed promising candidates. Next, scientists will test selected "hits" in biochemical and cell-based studies before proceeding to tests in animals and, ultimately, humans. This work will also call upon the expertise of imaging specialists such as Dr. Garcia, professor of medicine (cardiology) and of radiology, chief of the division of cardiology at Einstein and Montefiore, and holder of the Pauline A. Levitt Chair in Medicine, plus a large team of cardiac experts.

INFLAMMATION FIGHTERS

Inflammation is the focus of much of Einstein's basic cardiac research. "Inflammation evolved as a response to injury," explains Nikolaos G. Frangogiannis, M.D., professor of medicine (cardiology) and the Edmond J. Safra/Republic National Bank of New York Chair in Cardiovascular Medicine (see facing page). "Immediately after an injury anywhere in the body, inflammation repairs injured tissue and helps prevent bacteria from contaminating wounds. Likewise, in the early days following a heart attack, inflammation is good because it prevents the heart from rupturing. But over the long term, inflammation and scarring damage the heart and interfere with its function." Dr. Frangogiannis' pioneering work has led to important insights into how inflammation starts and stops following a heart attack, and ways in which this double-edged sword can be controlled.

Another important regulator of inflammation is the family of naturally occurring lipids known as prostaglandins. In order to be turned off after they have done their job, these compounds need to get from the blood into cells—a task carried out by a protein called the prostaglandin transporter (PGT). The lab of Victor L. Schuster, M.D., professor in the departments of medicine (nephrology) and of physiology & biophysics, chair of the department of medicine at Einstein and Montefiore, and the Ted and Florence Baumritter Chair in Medicine, made a fundamental discovery in 1995 by identifying the first PGT. Dr. Schuster and his colleagues have now identified a series of PGT inhibitors that could help treat hypertension and blood clots, by manipulating the action of an array of prostaglandin forms. "We've done extensive tests on blood pressure in mice and in 2010 licensed the technology to a small biotech startup company," says Dr. Schuster.

Balloon angioplasty and stenting are mainstays of treating atherosclerotic narrowing in coronary artery disease. But one problem with these



NEW TO EINSTEIN

EVRIPIDIS GAVATHIOTIS, PH.D.

In 2008, Dr. Gavathiotis, a structural biologist and chemist, accomplished a remarkable scientific feat: He determined the structure and discovered the "on-off switch" of a protein called BAX that plays critical roles in heart disease—and also in cancer. Many prior investigators had attempted and failed to determine the switch on the structure of BAX.

Now knowing the BAX structure, Dr. Gavathiotis is using it to develop new drugs for heart disease and cancer. The heart disease drugs will turn off BAX and stop heart muscle cells from dying, while the cancer drugs will turn it on to kill tumor cells. His tools for further targeting BAX are structural and chemical biology and, soon, in vivo animal studies.

Dr. Gavathiotis will bring valuable expertise to Einstein's planned Center for Molecular Therapeutics and Drug Discovery, whose mission will be to translate Einstein discoveries into solutions for improving human health.

Dr. Kitsis is delighted to have recruited Dr. Gavathiotis from Harvard Medical School. He joins the Einstein faculty as assistant professor of biochemistry and of medicine.

procedures is that they may damage the artery wall, making it thicker and triggering a rebound narrowing over several months. This phenomenon—known as restenosis—is due to cell growth and inflammation within the wall of the blood vessel. Nicholas E. S. Sibinga, M.D., associate professor of medicine (cardiology) and of developmental and molecular biology, and his team have identified a protein called Fat1 that may help decrease these negative effects of angioplasty. Dr. Sibinga has deleted the gene for Fat1 in mice and observed more arterial thickening after injury compared to normal mice. The researchers have also found another group of proteins called atrophins that cause arterial thickening and damage.

"We want to identify new proteins that either cause or help to correct common vascular diseases," says Dr. Sibinga, attending physician at the Einstein Montefiore Center for Heart and Vascular Care. "We aim to devise new treatments to manipulate these proteins to therapeutic advantage."

REPAIRING BROKEN HEARTS

Bin Zhou, M.D., Ph.D., associate professor of genetics, of pediatrics and of medicine (cardiology), works to repair damaged hearts, cell by cell. Recently, Dr. Zhou and his colleagues made an important discovery: They identified the stem cells in the developing fetus that eventually give rise to the coronary arteries—the same vessels that can become laden with plaque, eventually resulting in heart attacks. Dr. Zhou's breakthrough opens up the possibility of using stem cells as an alternative approach to repair the coronary arteries.

Estate of Beatrice Steinhauser

The Estate of Beatrice Steinhauser made a bequest to Einstein totaling $690,000. The funds have been designated for cancer research and cardiovascular disease research. Part of the gift will help support a new shRNA genomics facility, which offers Einstein investigators a technology for probing the genetic origins of cancer and autoimmune disorders. A portion will be used to purchase equipment for researchers at the Wilf Family Cardiovascular Research Institute and in the Cardiac Physiology and Surgery Core. The gift will also support the research of Nikolaos G. Frangogiannis, M.D., the Edmond J. Safra/Republic National Bank of New York Chair in Cardiovascular Medicine.

The Beatrice and Samuel A. Seaver Foundation

A commitment of $200,000 from The Beatrice and Samuel A. Seaver Foundation will support medical research and education programs at Einstein. This unrestricted gift was made possible through the efforts of John D. Cohen and Hirschell E. Levine, who serve as trustees of the foundation. The Seaver Foundation has been a longtime Benefactor of the College of Medicine.

NEW TO EINSTEIN

NIKOLAOS G. FRANGOGIANNIS, M.D.

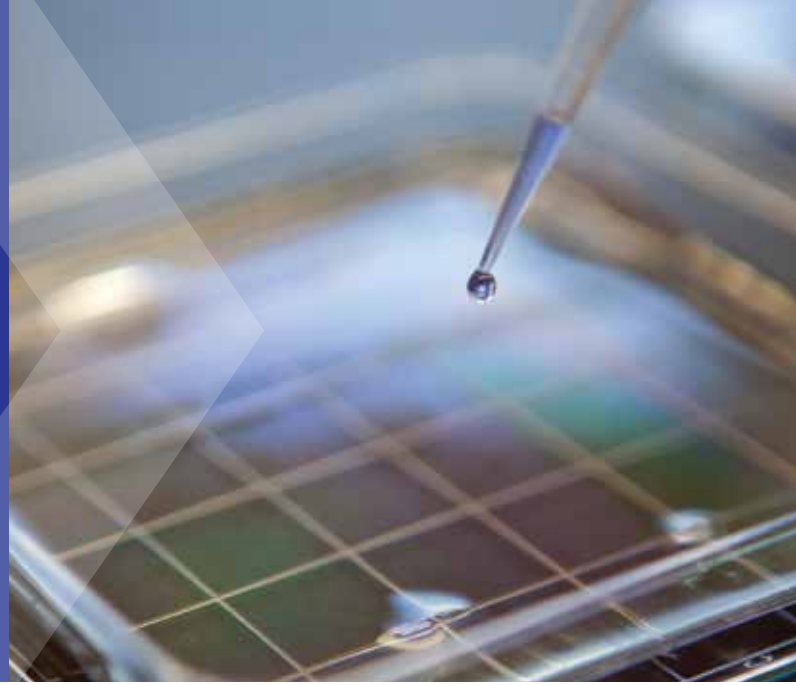
Most researchers look at how the inflammation resulting from a heart attack begins. Dr. Frangogiannis aims to stop inflammation and heal hearts without scarring—"a critical goal of cardiovascular research," he says. Dr. Kitsis recruited Dr. Frangogiannis in 2010 from Baylor College of Medicine in Houston. "Nick is one of the world's experts in this area, and I convinced him that Einstein is the place where his work would thrive," says Dr. Kitsis.

One direction of Dr. Frangogiannis' laboratory is to study regulatory T cells (Tregs) in cardiac injury and repair. Tregs are specialized cells that prevent our immune systems from attacking our own tissues. "Evidence suggests that Tregs may also prevent the damaging inflammation that follows cardiac injury," he says. "So cell therapy with Tregs may be a promising strategy to preserve heart muscle in patients who have had a heart attack."

Dr. Frangogiannis and his colleagues are also studying a protein known as transforming growth factor (TGF)-β that may be the "master switch" for turning inflamed heart muscle into scar tissue. Putting the brakes on TGF-β is a promising way to keep heart attacks from leading to heart failure.

lengthening longevity

scientists seek solutions at the molecular level



A study by Joe Verghese, M.B.B.S., finds that computerized brain-fitness programs may help frail seniors walk faster, potentially preventing disability.

Einstein launches SuperAgers.com, a website featuring an Einstein study of more than 500 healthy seniors between 95 and 112 years old.

The American Diabetes Association awards Jill Crandall, M.D., $600,000 to study resveratrol, the "antiaging" chemical in red wine that appears to control blood sugar.

Aging has always brought to mind that old adage about the weather: "Everybody talks about it, but nobody does anything about it." At Einstein, researchers finally are doing something about aging. They are uncovering the biological mechanisms that drive aging as well as those favoring longevity. And they are using that knowledge to devise therapies that will enhance healthy aging. That work, involving a staff of more than 60 investigators, is occurring in the Nathan Shock Center of Excellence in the Biology of Aging, created in 2010 through a $3.1 million grant from the National Institute of Health's National Institute on Aging.

Einstein's Shock award—one of only five in the nation—is a tribute to the work of three outstanding scientists: Nir Barzilai, M.D., professor of medicine (endocrinology) and of genetics and the Ingeborg and Ira Leon Rennert Chair in Aging Research, who directs the aging center, and Dr. Barzilai's two co-directors: Ana Maria Cuervo, M.D., Ph.D., professor of developmental and molecular biology, of anatomy and structural biology and of medicine (gastroenterology & liver diseases); and Jan Vijg, Ph.D., professor and chair of genetics, professor of ophthalmology and visual sciences and the Lola and Saul Kramer Chair in Molecular Genetics.

Aging has always brought to mind that old adage about the weather: "Everybody talks about it, but nobody does anything about it."

AGING: THE MOST IMPORTANT RISK FACTOR

"Most people don't realize it, but aging is the primary risk factor for major diseases including cancer, heart disease and Alzheimer's disease," says Dr. Barzilai. "Until we find a way to delay aging, we won't have much of an impact on any of these diseases."

Dr. Barzilai is looking for "longevity genes" that ward off aging. His helpers are a group of more than 500 healthy centenarians whom he began studying in 1998. By analyzing blood samples from these volunteers, he and his colleagues have so far identified variations in three genes that appear to promote longevity—and they expect to find more.

One of these gene variants, called CETP VV, gives people high levels of "good" HDL cholesterol. People with CETP VV run a lower risk for

Nir Barzilai, M.D., right, professor of medicine (endocrinology) and attending physician in the department of medicine (endocrinology) at Montefiore Medical Center. Assisting him is lab technician John Lofrese.

heart attacks and strokes, which may explain their unusual longevity. This and other Einstein discoveries may lead to drugs that mimic what longevity genes are doing for centenarians.

"A side effect of our work might be that people live longer," says Dr. Barzilai, "but our main goal is healthy living—enabling people to grow older without being burdened by the diseases of aging."

CLEANER CELLS, LONGER LIFE

Dr. Cuervo is a world-renowned expert on autophagy—the self-cleaning that cells carry out by digesting and recycling their worn-out proteins and other components.

Autophagy sounds mundane. But performing it efficiently—and preventing garbage from building up to toxic levels—is crucially important for cellular health. Dr. Cuervo's research has linked defects in autophagy to several diseases, including Alzheimer's, Parkinson's and Huntington's, and even to aging itself: Our cells become less efficient in carrying out autophagy as we get older, which may be a fundamental underlying cause of aging.

Dr. Cuervo has already identified the "weak link" in autophagy: a protein that juts like an antenna from tiny enzyme-filled bags called lysosomes. Its job is to bind to cellular garbage and pull it into the lysosome for digestion. But the protein, called LAMP-2A, becomes increasingly unstable as we age, causing autophagy to become less efficient. In research that may help put aging on hold, Dr. Cuervo is working to stabilize LAMP-2A so that autophagy stays revved up.

Ana Maria Cuervo, M.D., Ph.D., right, professor of developmental and molecular biology, with graduate student Samantha Orenstein.

In one strategy, high-throughput screening is being used to test 3,000 FDA-approved drugs on human skin fibroblasts, in the hope of finding one or more drugs that will stabilize LAMP-2A. In addition, one of Dr. Cuervo's grad students is designing proteins to home in on LAMP-2 and maintain its function, essentially by propping it up. Several prototypes have already been developed and will be tested on isolated lysosomes containing the LAMP-2 receptor.

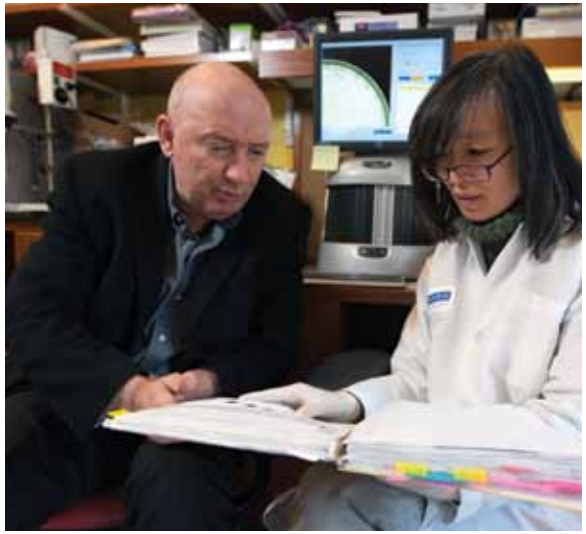
"If we can come up with ways to keep cells clean and healthy even as we age," says Dr. Cuervo, "we may be able to delay the onset of age-related diseases."

SEARCHING FOR THE CAUSE

For the past 20 years, Dr. Vijg has been investigating why aging happens. He believes the answer lies in mutations that accumulate in cells over time.

THE ELLISON MEDICAL FOUNDATION

A longtime supporter of aging research at the College of Medicine, The Ellison Medical Foundation continues to recognize the exceptional work being done by Einstein faculty members in this important area of research. Aviv Bergman, Ph.D., professor and founding chair, department of systems & computational biology, and professor of pathology and of neuroscience, received $248,279 this past year from the foundation as part of a multiyear award in support of his aging-related research. Other current recipients of multiyear grants include Claire Bastie, Ph.D., assistant professor of medicine (endocrinology); Marion Schmidt, Ph.D., associate professor of biochemistry; and Zhengdong Zhang, Ph.D., assistant professor of genetics and the College of Medicine's newest Ellison Foundation scholar, who has been granted a first-year award of $100,000.



Jan Vijg, Ph.D., professor and chair of genetics, with lab technician Moonsook Lee.

This tendency of our genomes to acquire mutations, he says, may provide the link between the process of aging and age-related diseases.

"We know surprisingly little about how aging and diseases of aging are related," says Dr. Vijg. "The older you get, the higher your risk for diseases such as heart disease and cancer. But why? Is there some intrinsic process in aging that predisposes you to these diseases? Cancer is clearly caused by mutations, so the accumulation of mutations during aging could easily explain our increased risk for cancer. So for all the body's organs and tissues, I can easily imagine that a mutation process is going on that increases genomic instability. If so, it would be the unifying factor linking aging with age-related diseases and the functional declines of aging. That's the area we're now working on."

Dr. Vijg is planning a study that for the first time will look for the specific mutations that occur in individual cells during aging. It will focus on the heart—an organ that experiences a significant decline in function with age.

Using young and old mice, Dr. Vijg and his colleagues will isolate 10 individual heart-muscle cells (cardiomyocytes) from each. Then, using Einstein's state-of-the-art gene-sequencing system, the researchers will determine the entire genomes of each of the cells, looking for differences in mutations between old and young heart cells. (Seeking mutations in single cells is far superior to the usual technique of grinding up thousands of cells and obtaining an "average" genome for that tissue.)

"This study will give us complete information on the cells' mutation load—exactly how many mutations and where they are," says Dr. Vijg. "These results will help reveal whether mutations really do explain the aging process. If they do, we may be able to develop strategies for countering their effects."

Edward N. & Della L. Thome Memorial Foundation

The Edward N. & Della L. Thome Memorial Foundation, Bank of America, N.A., Trustee has awarded Luciano D'Adamio, M.D., Ph.D., professor of microbiology & immunology, a multiyear grant of $750,000 to support his research into Alzheimer's disease (AD). Dr. D'Adamio is an internationally recognized leader in the field of neurodegenerative disease and immunology. His groundbreaking work in advancing scientific understanding of the molecular mechanisms of AD, including his discovery of the role of the BR12 gene, may lead to innovative drug therapies.

S&L MARX FOUNDATION

A gift of $250,000 from the S&L Marx Foundation will help support studies on the role of pain and stress in cognitive decline, Alzheimer's disease and amnestic mild cognitive impairment. The studies are being conducted at Co-op City, a mixed-income housing facility in the Bronx. Richard B. Lipton, M.D., the Edwin S. Lowe Chair in Neurology and director of the Einstein Aging Study, is leading the research. The findings will contribute to a better understanding of the causes of Alzheimer's disease. This gift will also support the training of a postdoctoral fellow in clinical and translational research.

people power

how human studies help fight deadly diseases

Einstein's strategic research plan recommends that Einstein researchers capitalize on the availability of unique patient populations in the surrounding community.

An Einstein study in the *British Journal of Cancer* finds elevated blood sugar levels are associated with increased risk of colorectal cancer in older women.

The department of epidemiology & population health at Einstein and Montefiore is home to more than 140 full-time, part-time and voluntary faculty members.

WHY HUMAN STUDIES MATTER

Along with its strength in basic research, Einstein is known for the discoveries made by observing sick as well as healthy people living in their own communities and going about their daily lives.

Studying human populations is important, explains Albert Einstein Cancer Center epidemiology program co-leader Howard D. Strickler, M.D., professor of epidemiology & population health, because risk factors identified for disease in the laboratory setting aren't necessarily risks in the real world. "For example," he says, "viruses that induce cancer in test tubes don't always cause cancer in humans, and chemicals that cause cancer in mice or rats may have no effect on people."

To better understand, prevent and treat diseases such as cancer, AIDS and heart disease, Einstein researchers are examining various populations nationwide.

Risk factors identified for disease in the laboratory setting aren't necessarily risks in the real world.

Howard Strickler, M.D., right, professor of epidemiology & population health, with Mimi Kim, Sc.D., head of the division of biostatistics.

THE WOMEN'S HEALTH INITIATIVE

Begun in 1993 and funded by the National Institutes of Health (NIH), the Women's Health Initiative (WHI) initially focused on strategies for preventing heart disease, breast and colorectal cancer and osteoporosis in postmenopausal women. Einstein was one of 40 institutions across the United States chosen to conduct this long-term study of more than 161,000 women ages 50 to 79.

The most far-reaching WHI discovery to date is that hormone therapy for postmenopausal women incurs increased risks (for heart attack, breast cancer and stroke) that far outweigh its benefits, says principal investigator Sylvia Wassertheil-Smoller, Ph.D., professor of epidemiology & population health and the Dorothy and William Manealoff Foundation and Molly Rosen Chair in Social Medicine. Results from other WHI studies:

- Hormone therapy puts women at increased risk for mild cognitive impairment and dementia, including Alzheimer's disease.
- Women who are depressed are at increased risk for developing dementia or cognitive impairment.
- Calcium plus vitamin D supplements does not reduce osteoporotic fractures. Among women with a history of non-melanoma skin cancer, calcium plus vitamin D does reduce the risk of future melanoma.

Sylvia Wassertheil-Smoller, Ph.D., professor of epidemiology & population health.

The Women's Health Initiative found that hormone therapy for postmenopausal women incurs increased risks for heart attack, breast cancer and stroke.

- Multivitamin use does not prevent cancer or cardiovascular disease in postmenopausal women.
- Estrogen therapy with or without progestin is associated with greater brain atrophy.

Dr. Wassertheil-Smoller and other WHI researchers are continuing to monitor the trial's participants. "As the women age," she says, "we are looking at quality of life, frailty and psychological factors." They'll also study environment/gene interactions.

INSULIN AND IGF-1

As part of an expanding research initiative, Dr. Howard Strickler examines how insulin and related hormones affect people's risk of developing a wide variety of health problems—diabetes, cancer and the progression of infectious diseases such as HIV/AIDS, hepatitis and human papillomavirus, which causes cervical cancer. "Every cell in the body has receptors on its surface for insulin, and most also have receptors for the hormone known as insulin-like growth factor-1 (IGF-1)," he says. "A signal is sent when a hormone binds to its cellular receptor, so it makes sense that such signals could influence a broad range of medical conditions."

Using data from the WHI, Dr. Strickler and his colleagues—particularly Dr. Wassertheil-Smoller; Marc J. Gunter, Ph.D., formerly assistant professor of epidemiology & population health; and Thomas E. Rohan, M.D., Ph.D., professor and chair of the department of epidemiology & population health at Einstein and Montefiore—have already found that having high insulin levels (which often occur in tandem with obesity) is so strongly associated with breast cancer development that it actually seems to explain the breast cancer/obesity link. Clinical trials are now assessing whether metformin—a diabetes drug that makes the body more sensitive to the insulin it produces—may reduce the risk of breast cancer recurrence. Additional studies have shown that elevated levels of insulin increase the risk for endometrial cancer, and that both insulin and IGF-1 are risk factors for colorectal cancer.

Interestingly, while elevated insulin levels appear strongly linked to higher risk for breast and other cancers, HIV-positive patients with high IGF-1 levels were found to have significantly lower rates of developing AIDS. Such findings have clear implications for treating and preventing disease.

THE HISPANIC COMMUNITY HEALTH STUDY

On June 30, 2011, the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) finished enrolling 4,000 Bronx residents ages 18 to 74. They are part of a nationwide study of 16,000 Latinos sponsored by the NIH.

"Asthma, chronic obstructive pulmonary disease, diabetes, heart disease and obesity are globally important and especially devastating in Latino communities," says principal investigator Robert C. Kaplan, Ph.D., professor of epidemiology & population health.

Dr. Kaplan and other researchers in New York, Chicago, Miami and San Diego will collect information on study participants that includes diet and exercise habits, physical and dental health, hearing problems and sleep disturbances. They also will collect blood samples and stay in touch with participants. "We want to understand how people's health changes over time," says Dr. Kaplan.

Jackie Heim-Natanson

Jackie Heim-Natanson made a generous gift to support Einstein's Global Diabetes Initiative (GDI). Led by its founding director, Meredith Hawkins, M.D., professor of medicine (endocrinology), the GDI harnesses Einstein's resources in medical research and education to combat the growing global diabetes epidemic.

The gift has helped support research programs studying malnutrition diabetes in India, and expand innovative diabetes training programs developed by Dr. Hawkins and colleagues for healthcare personnel in Africa, India and other areas.

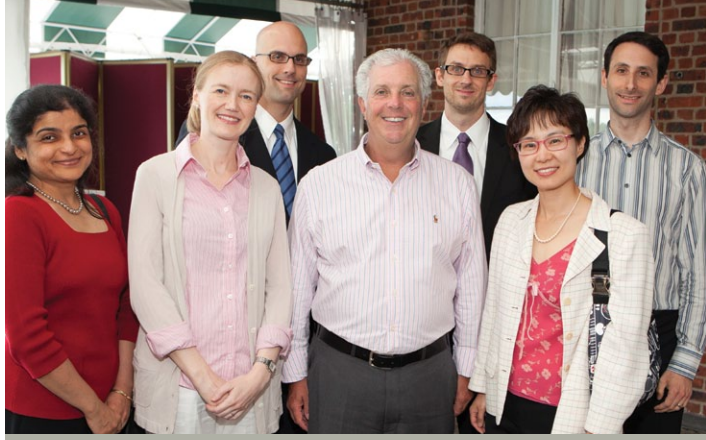
Ms. Heim-Natanson's decision to invest in the GDI was inspired by her grandfather, Max N. Natanson; her father, Norbert Natanson; and her aunt, Marjorie E. Myers, all of whom were supporters of the College of Medicine, and by learning about Einstein's work in addressing these important global health issues.

PROFILE

MARK H. KUNIHOLM, PH.D.

African fish were a key step along the path that Mark H. Kuniholm, Ph.D., took from school science fairs to working with the NIH-funded Women's Interagency HIV Study.

"Until my Peace Corps service, I hadn't heard of population science," says Dr. Kuniholm, assistant professor of epidemiology & population health and a Men's Division Research Scholar. Aquaculture and polio eradication work in the African country of Benin, plus the death of a friend's wife in childbirth, spurred him to apply his biology background to public health. At Einstein, he researches genetic factors that regulate the immune response against HIV and hepatitis C. At home, he spends time playing in the sandbox with his two-year-old or teaching her the guitar. "Through developing our children's experience, we contribute to society and to those who come after us," he says.



EINSTEIN'S MEN'S DIVISION: ADVANCING TRANSLATIONAL RESEARCH

The Men's Division has long helped advance the efforts of Einstein researchers. Currently, the Men's Division Research Scholars Program (MDRSP) supports the career development of Einstein physician-scientists who collaborate with senior scientists on cutting-edge translational studies focusing on cancer, diabetes, Alzheimer's disease and other serious medical conditions.

"The Men's Division is proud to help advance the training of Einstein's talented and dedicated physician scientists," says Raymond S. Cohen, chair of the Einstein's Men's Division.

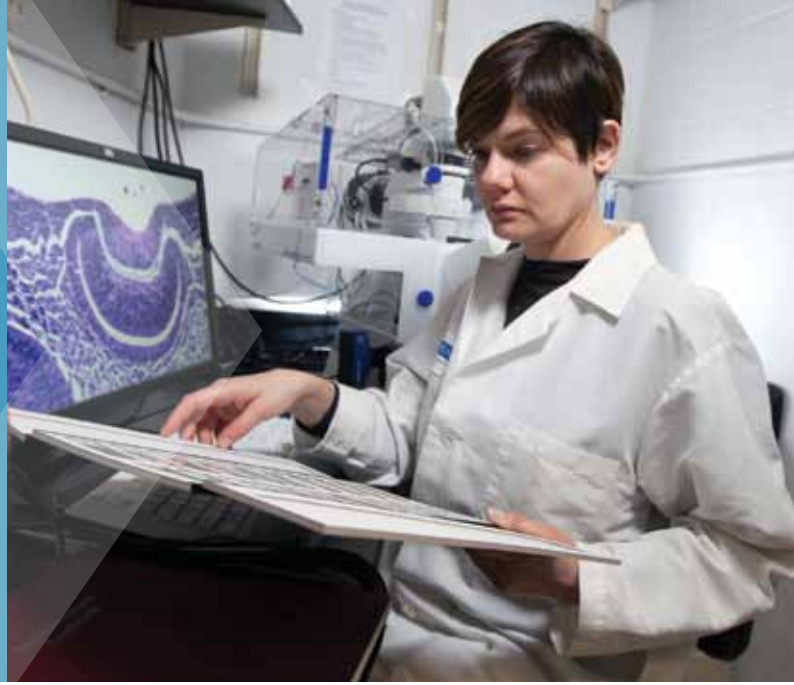
Harry Shamoon, M.D., associate dean for clinical and translational research, and Paul Marantz, M.D., M.P.H., associate dean for clinical research education, serve as faculty advisors for the MDRSP.

For more about Einstein's Men's Division, please turn to page 53.

Pictured above: Raymond S. Cohen, chair of the Einstein Men's Division, front row, second from right, with a group of Men's Division Research Scholars. From left: Deepa Rastogi, M.B.B.S., M.S.; Gabriele de Vos, M.D.; Sean Lucan, M.D., M.P.H., M.S.; Mark H. Kuniholm, Ph.D.; Mooyeon Oh-Park, M.D., M.S.; Matthew Abramowitz, M.D.

eye on research

preventing blindness and more



Roy S. Chuck, M.D., Ph.D., is appointed chair of the department of ophthalmology and visual sciences.

Dr. Chuck recruits Barrett Katz, M.D., M.B.A., as a professor; Dr. Katz is also director of the office of clinical trials at Einstein and Montefiore.

The department becomes fully supported by a Research to Prevent Blindness unrestricted grant.

EINSTEIN ON EYES

It was the early 1970s and Ales Cvekl, a Czech boy of 15, was sitting in awe in biology class. "The teacher had introduced the DNA-RNA-protein central 'dogma,' and I was very happy to learn about the molecular basis of life," he says.

Today, Dr. Cvekl, professor and vice chair for research in the department of ophthalmology and visual sciences and professor of genetics at Einstein, studies the mouse eye to learn more about genetic glitches that can occur during embryonic development and lead to serious vision problems. "The aberrant function of genes causes lens abnormalities as well as other human congenital eye diseases affecting the cornea, lens, iris and retina," he notes.

Dr. Cvekl and his group are also transforming skin cells from cataract patients into induced pluripotent stem cells (which behave much like human embryonic stem cells), and studying those pluripotent cells to learn more about cataract formation.

Research efforts such as these were important to Max Berger and his wife, Jean, both now deceased, who designated a generous bequest for research related to the human eye to honor the memory of Mr. Berger's father, Charles Berger. Two million dollars of the nearly $3.8 million Max Berger Trust were used to create the Max Berger Chair in Ophthalmology; Dr. Cvekl was invested as the chair's first occupant at Einstein's 2011

Dr. Cvekl and his group are transforming skin cells from cataract patients into induced pluripotent stem cells (which behave much like human embryonic stem cells), and studying those pluripotent cells to learn more about cataract formation.

Ales Cvekl, Ph.D., professor of ophthalmology and visual sciences, with Wei Liu, Ph.D., an instructor in the department.

Academic Convocation and Investiture. The funds from the trust will also be used to support vision research at Einstein.

Overseeing eye research at Einstein is Roy S. Chuck, M.D., Ph.D., professor and chair of ophthalmology and visual sciences at Einstein and Montefiore, and professor of genetics at Einstein. Since he was appointed chair in 2009, Dr. Chuck and his department have made major strides in the area of corneal stem cell surgery.

Cells in the cornea's outer layer, the epithelium, are constantly being sloughed off and regenerated, explains Dr. Chuck. The new cells are produced by a pool of stem cells in the eye, but injury and certain diseases can destroy them—resulting in painful vision loss. Dr. Chuck and his colleagues now perform a stem cell transplant procedure for this problem that has achieved a 40 to 50 percent success rate—one of the highest for any type of stem cell surgery.

The discoveries of Dr. Chuck and his colleagues will flow directly to patients at Montefiore.

Dr. Chuck's research is aimed at understanding and using stem cells from different parts of the body for transfer to the eyes—from the mouth, skin and hair, for example. "A lot of these studies are in laboratory trials right now, and we hope they'll make it to clinical trials in the near future," Dr. Chuck says.

In research not involving stem cells, Dr. Chuck is developing a more accurate laboratory model of dry eye, which may lead to better treatments for this common condition. In addition, he is developing a nonsurgical technique for correcting near- and farsightedness: special contact lenses combined with a photochemical process to permanently reshape the cornea. More than 90 million people in the United States are potential candidates for such a therapy.

The vision discoveries of Dr. Chuck and his colleagues will flow directly to patients at Montefiore, where the department of ophthalmology and visual sciences sees more patients than any other eye program in New York State (more than 125,000 patient appointments each year). Under the direction of Dr. Chuck, who holds the Paul Henkind Chair of Ophthalmology and Visual Sciences at Montefiore, the medical center has added 12 new eye specialists since 2009, for a total of 31 full-time faculty in the department.

On left, Roy Chuck, M.D., Ph.D., professor and chair of ophthalmology and visual sciences.

Research to Prevent Blindness

Research to Prevent Blindness (RPB) has awarded a grant of $100,000 to the department of ophthalmology and visual sciences at Einstein to support research into the causes, treatment and prevention of diseases of the eye associated with blindness. Roy Chuck, M.D., Ph.D., chair of the department, will direct the research. RPB, the world's leading voluntary organization supporting eye research, has awarded grants totaling $1.5 million to the College of Medicine.

TRUE VISION: BRANNA AND IRVING SISENWEIN

The Einstein community was deeply saddened by the passing of longtime friend and supporter Irving (Irv) Sisenwein in 2010. Together with his beloved wife, Branna, who survives him, Irv devoted more than 60 years to supporting ophthalmological research.

Both native New Yorkers, the Sisenweins started out as business partners. Just a year after their marriage in 1945, Irv lost his sight. Soon after they relocated to California in 1975, Branna developed macular degeneration. These turns of fate became the impetus for a new direction in their lives: a dynamic philanthropic partnership focused on eradicating blindness and other diseases of the eye.

In 2001 they established the Branna and Irving Sisenwein Chair in Ophthalmology and Visual Sciences at Einstein through a gift that represented, at that time, the largest contribution for a named chair in the history of the College of Medicine.

In recognition of their extraordinary accomplishments and their devotion to Einstein, Irv and Branna received honorary doctoral degrees from Yeshiva University in 2007.

Roy Chuck, M.D., Ph.D., chair of ophthalmology and visual sciences, visited the Sisenweins in California. "I have been honored to know this remarkable couple for a long time," he says. "Irv's warmth, intelligence and concern for humanity, like Branna's, informed his passion for helping advance eye research."

Einstein Benefactors Irv and Branna Sisenwein in 2007, after receiving honorary doctoral degrees from Yeshiva University.

board of overseers

keeping einstein at the forefront

Einstein's Overseers are committed to ensuring that the College of Medicine remains on the leading edge of scientific innovation, medical education and clinical care.

"We are honored to have these accomplished individuals join our ranks. Their shared passion for our mission and their commitment to the humanistic values and scientific excellence exemplified by the College of Medicine will be great assets."

RUTH L. GOTTESMAN, ED.D., CHAIR, EINSTEIN BOARD OF OVERSEERS

The Einstein Board of Overseers welcomed five new members over the course of 12 months: Sue-ann Friedman, Nathan Gantcher, Karen A. Mandelbaum, Edward S. Pantzer and Elizabeth Stanton. Representing professions and interests ranging from media and business to social welfare and philanthropy, the new Overseers add their diverse talents to an already vibrant group of leaders dedicated to advancing the growth and development of the College of Medicine far into the future.

"We are honored to have these accomplished individuals join our ranks," said Board Chair Ruth L. Gottesman, Ed.D. "Their shared passion for our mission and their commitment to the humanistic values and scientific excellence exemplified by the College of Medicine will be great assets."

The addition of this group is part of a strategic recruitment effort designed to continue strengthening the Einstein Board of Overseers. Plans call for new members to be added in the coming months.

New Einstein Overseers, from left: Sue-ann Friedman, Edward S. Pantzer, Karen A. Mandelbaum, Nathan Gantcher and Elizabeth Stanton.

einstein in florida

raising awareness

In 2011, Einstein friends and supporters in Florida participated in stimulating discussions led by noted Einstein faculty members. Topics included the latest research developments at Einstein in aging, cancer, diabetes and heart disease.

Einstein Overseer Marilyn Katz, founding chair of the Cancer Research Advisory Board of the Albert Einstein Cancer Center (AECC), and her husband, Overseer Stanley M. Katz; Overseers Karen Mandelbaum and Sue-ann Friedman; and Ronald Ross, M.D. '60, and his wife, Helen, hosted events in Palm Beach, Jupiter and Boca Raton, respectively.

Guest speakers at the Palm Beach luncheon held in January 2011 were Nir Barzilai, M.D., director of Einstein's Institute for Aging Research and the Ingeborg and Ira Leon Rennert Chair in Aging Research, and Sylvia Wassertheil-Smoller, Ph.D., the Dorothy and William Manealoff Foundation and Molly Rosen Chair in Social Medicine and principal investigator, Women's Health Initiative. In March, the featured speakers were Allen M. Spiegel, M.D., the Marilyn and Stanley M. Katz Dean; Steven K. Libutti, M.D., associate director of clinical services at the AECC, director of the Montefiore Einstein Center for Cancer Care, vice chair of surgery at Einstein and Montefiore, and professor of surgery and of genetics at Einstein; and Robert E. Michler, M.D., chair of surgery and of cardiovascular and thoracic surgery at Einstein and Montefiore, co-director of the Montefiore Einstein Heart Center, surgeon-in-chief at Montefiore, professor of surgery and of cardiovascular and thoracic surgery at Einstein, and the Samuel Belkin Professorial Chair.

All of these programs were extremely well attended.

Einstein returned to Florida in January 2012, with John J. Foxe, Ph.D. '99, director of research, Children's Evaluation and Rehabilitation Center, and Victor L. Schuster, M.D., chair of medicine and the Ted and Florence Baumritter Professor, discussing recent developments in translational medicine. In March, Steven C. Almo, Ph.D., professor of biochemistry and of physiology and biophysics, Anne R. Bresnick, Ph.D., professor of biochemistry, and Dean Spiegel will be the featured speakers. The College of Medicine is grateful to Marilyn and Stanley M. Katz for hosting both programs at Palm Beach Country Club.

Einstein Overseers Marilyn and Stanley M. Katz, with Steven Libutti, M.D., left, and Robert Michler, M.D.

Overseer Diane Belfer with Nir Barzilai, M.D.

women's and men's divisions

partnering with einstein

For more than 50 years, Einstein's National Women's Division and Men's Division have provided leadership to advance medical research and education.

1 Men's Division members Peter Bernstein, Andrew Weinberg, Andrew Frank and Marc Altheim, 2011 Golf & Tennis Tournament and Dinner.

2 Overseers Linda Altman and Rita Rosen with Alexandra Landes, Mrs. Rosen's granddaughter, Women's Division 2011 Spirit of Achievement Luncheon.

3 Women's Division 2011 Hamptons Family Day co-chairs Mindy Feinberg, Jackie Harris Hochberg, Amanda Poses, Alison Hirshman Brettschneider and Bari Katz.

4 Spirit Luncheon co-chairs, from left: Andrea Stark, Jackie Harris Hochberg and Renée Steinberg.

To mark the 50th anniversary of the Men's Division, the division honored its past chairs at its annual Golf & Tennis Tournament and Dinner, held on June 13, 2011. Front row, from left: Philip Rosen, Jay N. Goldberg, David J. Klein, Stanley M. Katz, Asriel (Rickey) Rackow, Burton P. Resnick, Philip S. Altheim and Bruce F. Roberts. Back row, from left: Dean Allen M. Spiegel, M.D., Robert C. Patent, Mitchell Wm. Ostrove, Jeffrey A. Fiedler, Stephen R. Karafiol, David H. Schwartz, Neil A. Clark, Jack M. Somer, Peter A. Gatof and Men's Division Chair Raymond S. Cohen.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alumni

widening the einstein circle

"Our initiatives helped create a heightened sense of community and connection among alumni and students, and we look forward to building upon these successes in the future."

JACK STERN, M.D. '74, PH.D. '73
ALUMNI ASSOCIATION PRESIDENT

The Einstein Alumni Association launched several exciting programs this past year to strengthen the connections between Einstein's student body and its nationwide alumni network. The Alumni Relations Office hosted a variety of special events for alumni, parents and friends in New York, Boston, Washington, DC, South Florida, and Northern and Southern California; alumni across the country were encouraged to join the Alumni Career Network to reach out to students seeking career advice.

"I'm delighted with the enthusiastic response to our efforts to create an alumni association whose national presence better reflects the medical school's diversity. Our Alumni Association also expands opportunities for students to access career mentoring, and facilitates outreach to prospective students regardless of their geographic location," said Alumni Association President Jack Stern, M.D. '74, Ph.D. '73. "Our initiatives this year helped create a heightened sense of community and connection among alumni and students, and we look forward to building upon these successes in the future."

In June, alumni who graduated in years ending in 1 and 6 returned to Einstein to celebrate Reunion 2011. They reconnected with classmates, marched at Commencement and honored the Class of 1961—the third class of Einstein graduates—as they celebrated their 50th Anniversary Reunion. The Alumni Day on Campus attendees were impressed by the transformations that have taken place at their alma mater since their medical school days.

1

1 Members of the class of 1976, including Edward R. Burns, M.D. ’76, executive dean.

2 Members of the class of 1961 at the Gala Reunion Dinner. From left, Zalman Schrader, M.D.; Paul Wachter, M.D.; Kenneth Schiffer, M.D.; Martin Brownstein, M.D.; and George Teebor, M.D.

3 At the Gala Reunion Dinner, Melanie Hoenig, M.D. ’91, and Giselle Corbie-Smith, M.D. ’91.

4 At Einstein in San Francisco, Laurence J. Marton, M.D. ’69, and Dean Allen M. Spiegel, M.D.

5 Jack Stern, M.D. ’74, Ph.D. ’73, president of the Einstein Alumni Association, with Einstein students at the Scrubs Ceremony.


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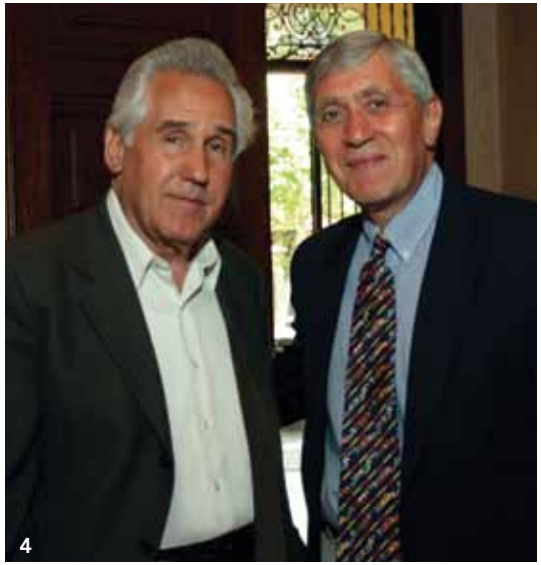
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grants

Research at the College of Medicine is supported by an impressive number of National Institutes of Health grants.

RESEARCHING PROTEIN STRUCTURE AND FUNCTION

Einstein has received a five-year, $30 million National Institute of General Medical Sciences grant to study the structure and function of thousands of biomedically important proteins, "the first step toward understanding their role in normal biological processes as well as in disease pathways," says principal investigator Steven C. Almo, Ph.D., professor of biochemistry and of physiology & biophysics. Einstein scientists also received approximately $11 million of a $33 million, five-year NIH "glue grant" to identify the structure and function of enzymes. So-called glue grants are aimed at solving complex problems that are crucially important but beyond the means of any one research group. After other team members have identified enzymes of interest, co-investigator Dr. Almo and his colleagues will use X-ray crystallography to determine their molecular structure.

SUPPORT FOR TB RESEARCH

Tuberculosis (TB) kills two million people each year, making it the world's deadliest bacterial infection. Several large grants have put Einstein at the forefront of efforts to control TB and develop better therapies:

- Neel R. Gandhi, M.D., associate professor of medicine (general internal medicine) and assistant professor of epidemiology & population health, has received a five-year, $4 million NIH grant for the first-ever prospective study of antiretroviral therapy for people in South Africa who are co-infected with multi-drug-resistant TB and HIV.
- William R. Jacobs Jr., Ph.D., professor of microbiology & immunology and of genetics, a Howard Hughes Medical Institute investigator and a primary researcher at the KwaZulu-Natal Research Institute for Tuberculosis and HIV, will systematically knock out every *Mycobacterium tuberculosis* gene to find those genes on which the bacterium depends for resisting drugs and causing disease. His three-year, $4 million NIH grant will support the work.
- Sarita Shah, M.D., associate professor of medicine (general internal medicine) and assistant professor of epidemiology & population health, has been awarded a five-year, $3.9 million grant from the NIH to study how extensively drug-resistant (XDR) TB is transmitted in rural South Africa.

RADIATION COUNTERMEASURES

Radiation—whether from cancer therapy or from a dangerous dirty bomb—can prove fatal if it damages the sensitive lining of the intestines. Chandan Guha, M.B.B.S., Ph.D., professor of radiation oncology and of pathology and vice chair of the department of radiation oncology, has shown that mice can survive a lethal dose of radiation if they receive transplanted stromal stem cells from the bone marrow of other mice within 24 hours of radiation exposure. The Centers for Medical Countermeasures Against Radiation (funded by the NIH) has awarded Dr. Guha a five-year, $11.8 million grant to continue his research.

NIH GRANT FOR STEM CELL LABS

The NIH already supports the stem cell research of nearly two dozen Einstein researchers and has now awarded Einstein $10 million to create stem cell laboratories for several new senior investigators. "A key aspect of our plan is to embed stem cell laboratories within easy reach of Einstein's centers

in diabetes, cancer, HIV/AIDS, liver disease and women's health to encourage the free flow of science," says Harry Shamoon, M.D., associate dean for clinical and translational research, professor of medicine (endocrinology) and director of the Institute for Clinical and Translational Research.

DIABETES CENTER WINS NIH SUPPORT

Einstein's Diabetes Research and Training Center (DRTC) has received a five-year, $9.5 million grant from the NIH's National Institute of Diabetes and Digestive and Kidney Diseases. The DRTC was also awarded $632,000 in federal stimulus money, for a total of more than $10 million in federal support. "These grants come at a critical time," says Jeffrey Pessin, Ph.D., principal investigator and director of Einstein's DRTC, who holds the Judy R. and Alfred A. Rosenberg Endowed Professorial Chair in Diabetes Research and is professor of medicine (endocrinology) and of molecular pharmacology. "Diabetes is already a major threat to public health and its prevalence is quickly rising—not only here in the Bronx, but also nationally and internationally."

THE GENOMICS OF IMMUNITY

Aberrant immune responses cause a wide range of autoimmune diseases, including type 1 diabetes and multiple sclerosis. In a project he calls "Atoms to Animals: Structural Genomics of Immunity," Stanley G. Nathenson, M.D., distinguished professor of microbiology & immunology and of cell biology and the Samuel H. Golding Chair in Microbiology, is studying the molecules that control adaptive and innate immunity, the two main types of immune response. Dr. Nathenson has received an NIH grant of nearly $6 million to support his work.

HELPING OLDER PEOPLE STAY MOBILE

The NIH has awarded Einstein and Yeshiva University's Ferkauf Graduate School of Psychology a five-year, $3.4 million grant to identify cognitive factors that could be modified to help older people remain active. "Then we want to see whether modifying those factors can help prevent mobility decline and disability," says Roee Holtzer, Ph.D., principal investigator for the study, associate professor in the Saul R. Korey Department of Neurology and associate professor at Ferkauf.

EINSTEIN A CENTER OF EXCELLENCE IN AGING

The NIH has named Einstein one of five Nathan Shock Centers of Excellence in the Basic Biology of Aging. The College of Medicine's selection comes with a $3.1 million, five-year grant that funds three core areas of research at Einstein. Three members of Einstein's Institute for Aging Research will lead the new center: Nir Barzilai, M.D., professor of medicine (endocrinology) and of genetics and the Ingeborg and Ira Leon Rennert Chair in Aging Research; Ana Maria Cuervo, M.D., Ph.D., professor of developmental and molecular biology, of anatomy and structural biology and of medicine (gastroenterology and liver diseases); and Jan Vijg, Ph.D., professor and chair of genetics, professor of ophthalmology and visual sciences and the Lola and Saul Kramer Chair in Molecular Genetics.

TARGETING A PARASITE

Kami Kim, M.D., professor in the departments of medicine (infectious diseases) and of microbiology & immunology, has received an NIH grant of more than $3 million over five years to support her research on *Toxoplasma gondii*, a parasitic pathogen

that causes severe disease in immunocompromised individuals, including people with AIDS. Dr. Kim and her team will use epigenomics, proteomics and computational biology to study newly discovered *T. gondii* genes that regulate the parasite's development. The research may lead to drugs that target the *T. gondii* genes.

Our Supporters

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Our new Benefactors are in blue bold type on the list below:

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Bold type reflects an Einstein alumnus or alumna

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Gifts from the estates and trusts listed below were received during the period from July 1, 2010, to June 30, 2011. We greatly appreciate their legacy of caring and support.

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Recent Trends in NIH Funding

EINSTEIN SUCCESS IN SPITE OF DIFFICULT CLIMATE FOR NIH FUNDING

Einstein increased its NIH grant awards from FY10's $155 million to FY11's $167 million. This success shows that our faculty is highly productive—and was achieved despite our relatively small size and the lack of our own hospital compared with many of the other top 40 schools. As the tables at right indicate, Einstein increased its NIH-grant ranking among the top 40 medical schools from 26th to 23rd from FY10 to FY11. This was particularly notable in light of the extremely low success rate for grant application approvals in FY11: only 18%, the lowest rate of grant approvals in NIH history.

[1] Rankings published by the Blue Ridge Institute for Medical Research. Awards exclude ARRA (stimulus) funding.

[2] Information accessed 12/14/11.

EINSTEIN PROFILE

M.D. students: 724
Ph.D. students: 248
M.D./Ph.D. students: 117
Faculty: 2,522
Applicants to the Class of 2015: 7,634
Students in the Class of 2015: 183
Residency programs offered: 155
Physicians in training at Einstein and affiliated hospitals: 2,200
Postdoctoral research fellows: 368
NIH-funded centers: 9
Einstein alumni: 8,500

AFFILIATED MEDICAL CENTERS:

Montefiore Medical Center
Beth Israel Medical Center
Bronx-Lebanon Hospital Center
Jacobi Medical Center
Maimonides Medical Center
North Shore–Long Island Jewish Health System
St. Barnabas Hospital

NIH Grant Awards to Medical Schools[1]

FY2010			FY2011[2]		
Rank	School	Amount	Rank	School	Amount
1	Johns Hopkins University	$438,777,365	1	Johns Hopkins University	$450,715,884
2	University of California San Francisco	$422,075,871	2	University of California San Francisco	$420,151,303
3	University of Pennsylvania	$402,581,229	3	University of Pennsylvania	$391,204,849
4	Washington University	$365,408,802	4	Washington University	$348,021,415
5	Yale University	$351,980,590	5	Yale University	$338,559,136
6	University of Michigan at Ann Arbor	$332,503,441	6	University of Michigan at Ann Arbor	$318,762,070
7	University of Pittsburgh	$325,623,858	7	University of Pittsburgh	$316,361,337
8	Duke University	$305,653,535	8	University of California San Diego	$309,349,318
9	University of California San Diego	$302,658,871	9	University of Washington	$297,093,639
10	University of Washington	$300,387,633	10	Vanderbilt University	$293,399,066
11	Vanderbilt University	$296,277,355	11	Duke University	$288,847,867
12	University of California Los Angeles	$294,323,006	12	University of California Los Angeles	$287,084,289
13	Stanford University	$292,471,130	13	Stanford University	$286,992,947
14	University of North Carolina Chapel Hill	$238,601,335	14	Columbia University Health Sciences	$248,309,558
15	Columbia University Health Sciences	$235,320,298	15	University of North Carolina Chapel Hill	$235,452,202
16	Emory University	$226,961,115	16	Emory University	$223,910,248
17	Baylor College of Medicine	$202,576,771	17	Baylor College of Medicine	$206,772,619
18	Mayo Clinic	$184,008,362	18	Mayo Clinic	$193,905,832
19	Mount Sinai School of Medicine	$180,312,503	19	Oregon Health and Science University	$178,751,685
20	Oregon Health and Science University	$178,199,324	20	University of Chicago	$175,532,863
21	Harvard University (Medical School)	$175,784,225	21	Mount Sinai School of Medicine	$174,809,946
22	University of Chicago	$173,664,348	22	University of Texas SW Med Ctr/Dallas	$169,704,031
23	University of Texas SW Med Ctr/Dallas	$170,252,955	**23**	**Albert Einstein Col of Med Yeshiva Univ**	**$167,197,451**
24	University of Rochester	$167,774,604	24	Northwestern University	$164,193,632
25	University of Alabama at Birmingham	$158,476,912	25	Harvard University (Medical School)	$163,103,132
26	**Albert Einstein Col of Med Yeshiva Univ**	**$155,235,253**	26	University of Colorado Denver	$161,820,479
27	Northwestern University	$154,467,225	27	New York University School of Medicine	$151,225,594
28	University of Colorado Denver	$150,370,495	28	University of Alabama at Birmingham	$149,533,584
29	University of Minnesota Twin Cities	$141,020,100	29	University of Minnesota Twin Cities	$148,175,782
30	Case Western Reserve University	$140,811,670	30	Case Western Reserve University	$146,358,855
31	New York University School of Medicine	$139,758,137	31	University of Maryland Baltimore	$141,617,570
32	Univ of Massachusetts Med Sch Worcester	$139,730,121	32	Univ of Massachusetts Med Sch Worcester	$139,358,639
33	University of Maryland Baltimore	$137,349,997	33	University of Rochester	$137,998,105
34	University of Wisconsin Madison	$135,377,564	34	University of Southern California	$134,246,848
35	University of Iowa	$134,857,309	35	University of Wisconsin Madison	$131,812,044
36	University of Southern California	$134,457,725	36	University of California Davis	$130,451,611
37	University of California Davis	$118,944,372	37	University of Iowa	$124,537,273
38	University of Virginia Charlottesville	$116,782,640	38	Weill Medical College of Cornell Univ	$118,602,619
39	Weill Medical College of Cornell Univ	$112,590,734	39	University of Miami School of Medicine	$111,682,728
40	Indiana Univ-Purdue Univ at Indianapolis	$108,189,681	40	Indiana Univ-Purdue Univ at Indianapolis	$108,491,477

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