Brown University Division of Biology and Medicine

BROWN

TABLE OF CONTENTS

I am pleased to present our annual overview of Brown University's Division of Biology and Medicine. The theme, *Connect, Collaborate, Cure,* is the essence of what our students and faculty do every day. At Brown, research, clinical care, and education thrive in a collaborative culture that encourages our people to think beyond administrative and disciplinary boundaries. Connections spark new discoveries and new ways of approaching old problems.

During this year, I convened the Division's senior leadership team and asked them to work with me on writing a mission statement for the Division and defining our vision and values. Over the course of a few months, we labored to capture the essence of the Division—which encompasses the Program in Biology, Alpert Medical School, and the Public Health Program. We developed a simple statement that represents the strengths of each and their common purpose:

The mission of the Division of Biology and Medicine at Brown University is to understand and improve the health of individuals and populations and the environments in which they live.

The team also articulated the Division's core values: integrity, creativity, initiative, education, collaboration, social responsibility, and respect for diversity. As we carry out our commitment to teaching, research, and patient care, we do so always with these values in mind.

One of the Division's great successes during the last fiscal year was a 37 percent increase in external research funding. The Division received $94.6 million in fiscal 2010, compared to $64.4 million in fiscal 2009. Our departments of Neuroscience and Community Health did particularly well competing for grants made possible by the American Recovery and Reinvestment Act of 2009. In addition, faculty in our clinical departments expended nearly $120 million, giving an enterprise-wide total of $300 million.

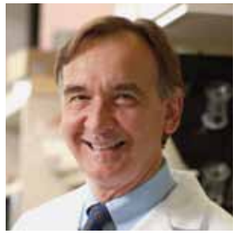
Two important department chair positions were filled this year. Louis Rice was appointed chair of the Department of Medicine. His reputation and experience as an expert researcher in infectious diseases, combined with his work with the National Institutes of Health, make him a tremendous asset to our students and faculty. Garth Rees Cosgrove, an expert in brain tumors and radiosurgery, was appointed inaugural chair of the Department of Neurosurgery. This appointment will make possible important future collaboration with the departments of Neuroscience, Psychiatry, and Neurology.

In April 2010, we celebrated the groundbreaking on the new medical school building, which you'll read more about in this annual report. This is unequivocally one of the most significant milestones in our history: the building will not only serve as Alpert Medical School's first dedicated home, but will enable us to advance the School by providing needed and tailored space for a larger student body and new programs such as the Academy system of learning communities.

I am tremendously proud of the accomplishments of the Division's faculty, students, and staff and pleased to share them with you in this report.

Edward J Wing

Edward J. Wing, MD
Frank L. Day Professor of Biology and
Dean of Medicine and Biological Sciences
The Warren Alpert Medical School of Brown University



In the last year, increased federal support for basic research has helped accelerate the rate of exciting discoveries being made at Brown, and many more predoctoral graduate students are successfully competing for prestigious individual fellowships. Private foundations often support research and infrastructure needs that fall outside areas targeted by federal agencies, and we were thrilled that the Howard Hughes Medical Institute awarded $1 million for undergraduate science education to the faculty team led by Professor Michael McKeown.

EDWARD HAWROT, PHD
ASSOCIATE DEAN FOR THE PROGRAM IN BIOLOGY, ALVA O. WAY UNIVERSITY PROFESSOR OF MEDICAL SCIENCE

The Program in Biology comprises five departments: Ecology and Evolutionary Biology; Molecular Biology, Cell Biology and Biochemistry; Molecular Microbiology and Immunology; Molecular Pharmacology, Physiology and Biotechnology; and Neuroscience. A sixth and hybrid department, Pathology and Laboratory Medicine, is also part of Alpert Medical School. Biology is one of the most robust programs at the undergraduate level, and accounts for 19 percent of the baccalaureate degrees awarded in 2010.

A hallmark of the Program in Biology is the high level of cutting-edge, multidisciplinary research conducted by both faculty and students. In the past year, the program has grown tremendously in its research infrastructure. Most notably, Brown opened an IBM-built multimillion-dollar supercomputer that has been used for research in genomics, ocean ecosystems, and human and animal movement. Professors, graduate students, postdoctoral students, and a few companies are the main users of the system, which can perform more than 14 trillion calculations per second. A state-of-the-art Science Center was also constructed this year.

THE EVOLUTION OF GRASSES

Over the past 30 million years, different groups of grasses independently evolved a mechanism that more efficiently converts sunlight and nutrients into energy. Today, about 50 percent of grasses use this upgraded system, called the C4 pathway (the other, more basic system is the C3 pathway).

The rise of these C4 plants is without question linked to dwindling concentrations of CO_2. But these grasses have also been closely linked with warmer temperatures: C4 grasses dominate the tropics and subtropics, while C3 grasses occupy cooler regions. It was long believed, then, that C4 photosynthesis evolved in response to warmer environments.

Two scientists—Erika Edwards, an assistant professor of biology in the Department of Ecology and Evolutionary Biology, and Stephen Smith, a researcher at the National Evolutionary Synthesis Center in North Carolina—weren't satisfied with that assumption, however. At the end of a long series of preliminary steps that included building the most comprehensive evolutionary tree to date for grasses, the scientists examined 21 stages at which C3 and C4 grasses diverged and examined the reconstructed climatic conditions during these periods. They found that in 18 of the 21 instances, precipitation, rather than temperature, had changed.

"We've kind of changed the story a bit," says Edwards.

In a paper published in the *Proceedings of the National Academy of Sciences,* the scientists found that declining rainfall—not temperature—was the primary trigger for C4 grasses' evolutionary beginnings. From the climate data, Edwards and Smith were able to infer that the ancestors of C4 grasses were living in wet, tropical forests, and that the evolution of the new pathway coincided with moving into drier, sunnier environments.

One larger question—what this means for the future of C4 grasses in the context of current and future climate change—is yet unanswered. While C4 grasses, it seems, would benefit from the lower mean rainfall that is projected for some areas of the tropics, they may not benefit from rising levels of atmospheric CO_2. Additionally, the effects of land use change through tropical deforestation and other practices would need to be considered, Edwards says.

ERIKA EDWARDS, PHD
ASSISTANT PROFESSOR OF BIOLOGY

“Humanistic medicine is a critical component of Alpert Medical School’s educational program. We teach our students that developing communication and observational skills is vital to their growth as caregivers—to their becoming respectful, considerate providers of care to people, not ‘cases.’”

PHILIP A. GRUPPUSO, MD
ASSOCIATE DEAN OF MEDICINE FOR MEDICAL EDUCATION

The Warren Alpert Medical School of Brown University, the only medical school in Rhode Island, is home to a community of scholars and physicians dedicated to the highest standards in education, research, and health care.

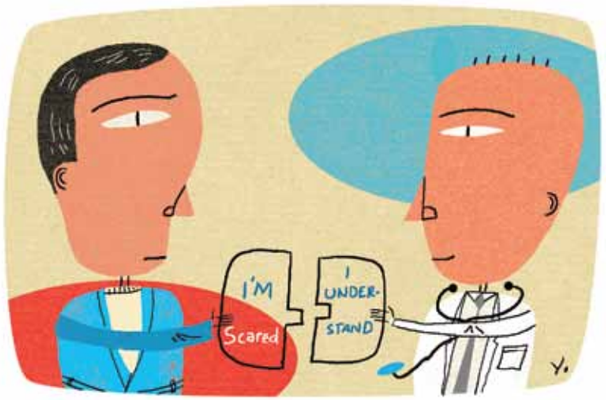
Important changes have been introduced over the past year. At the center of these developments is the construction of a 135,000-square-foot medical school building, the first dedicated home for the School in the 40 years since its founding. The Global Health Initiative—an umbrella program that will both link and enhance a number of existing programs to improve the health of people in resource-limited countries—was launched in September 2009.

The Medical School is in the midst of an exciting and innovative clinical curriculum redesign process. One change is that the popular Doctoring course is expanding to encompass the third and fourth years, which will help students transition from doctors-to-be to minted MDs as they approach intern year.

Amended hospital affiliation agreements that were initiated this past year will be discussed in the next annual report. These agreements will further solidify Alpert Medical School’s identity, reputation, and position among the nation’s top medical institutions.

PATIENT RELATIONS

For providers in today’s challenging health care environment, it is tempting to substitute quick, virtual interactions for those of the face-to-face variety, and difficult to see the patient beyond the relentless flow of diagnostic information. Humanistic medicine—the practice of fostering compassionate and empathetic relationships with patients and other caregivers—is without a doubt threatened.



Fortunately, the approach is still advocated and taught by the best providers and in the best medical programs. At Alpert Medical School, “humanistic care is at the core of our approach to training tomorrow’s doctors,” according to Edward J. Wing, MD, dean of medicine and biological sciences.

One physician at Brown stands out as an exemplar of the philosophy: Vice Chair of Medicine Fred Schiffman, a practicing oncologist and hematologist and medical director of the Comprehensive Cancer Center at Rhode Island and The Miriam hospitals. Schiffman is widely admired for his commitment to his patients and residents. Peers have regularly referred to him as “world class in his treatment of patients” and an “impeccable physician.” He has spearheaded a number of programs to advance humanistic medicine, including an effort to bring the Schwartz Center Rounds, which provide forums for peer-to-peer support and ultimately strengthen caregiver-patient relationships, to The Miriam Hospital.

Schiffman was recently honored as the inaugural Sigal Family Professor of Humanistic Medicine. The children of the late Phyllis and Irving Sigal endowed the $3 million professorship as a legacy to their parents and the excellent care they received at The Miriam Hospital and, in particular, from Schiffman. “This gift…allows us to carry out our parents’ wishes to influence the teaching, and ultimately the practice, of medicine by sharing and advancing the caring and patient-focused approach that Dr. Schiffman takes with all his patients,” says Andrew Sigal.

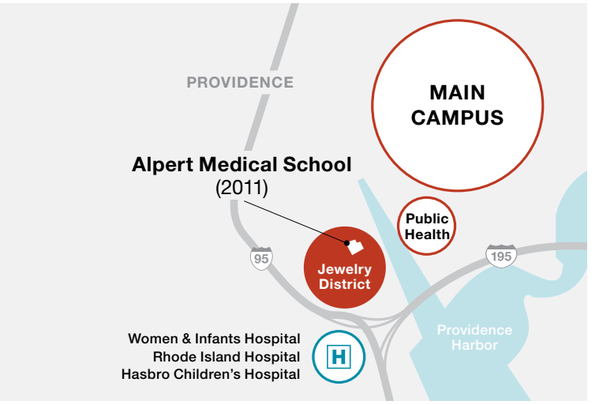
The Sigal gift will support traditional and innovative educational techniques, including grief rounds and home-visit programs. The professorship will bring Alpert Medical School’s students and residents one step closer to understanding that—as Schiffman asserted in his speech to the graduating Alpert Medical School class of 2009, quoting Dr. Edward Trudeau—physicians “cure sometimes, relieve often, but [must] comfort always.”

FRED SCHIFFMAN, MD
SIGAL FAMILY PROFESSOR OF HUMANISTIC MEDICINE

MEDICAL DIRECTOR
LIFESPAN COMPREHENSIVE CANCER CENTER

The New Medical School Building

Alpert Medical School's new building is slated to open its doors in July 2011, in time to welcome the MD Class of 2015. This building will be the first dedicated home since the Medical School's founding, in 1972.



The Jewelry District is the hub of Providence's emerging knowledge economy. Brown's Medical School building is strategically located between campus and the major teaching hospitals.

Located in a renovated jewelry factory in downtown Providence, the Medical School building is both an innovative nod to Providence's past and a bold step into the future. It will serve as the anchor of Providence's new Knowledge District and of a thriving academic medical center that includes numerous hospitals and laboratories. As the intellectual and economic capital of the area grows, the Medical School building will be a considerable source of pride not only for Brown University, but for the city and state as well.

It's been called a beacon. An economic driver. And it's sure to be a magnet.

Alpert Medical School's new building has so much going for it it's bound to attract the people and resources that make a community thrive.

It will attract students who want to learn the science and the art of medicine in a space that is at once custom designed and flexible. It will attract physicians and scientists who want to transmit their knowledge to the next generation in a modern yet comfortable setting. It will attract all health professionals who are committed to lifelong learning. It will attract dynamic and creative thinkers—from bench research to biotech—who are pushing the limits of knowledge to improve our health. And it will attract the businesses that support and complement any academic medical center: restaurants, hotels, shops, and residential space.

Reflecting Alpert Medical School's commitment to medical education and service to the community, the new building will make Rhode Island itself a magnet—for people who care about primary care. Faculty in the Department of Family Medicine recently received four federal grants totaling $4.4 million. These grants will be used to reform the family medicine curriculum, provide continuing education to health professionals from all

In addition to a state-of-the-art anatomy suite (top), the building will feature a rooftop terrace (above) with outdoor seating, "green roof" palettes, and a commanding view of the Providence River and College Hill.

over, recruit new faculty, and expand the department's interaction with community health centers. The grants will help transform family practices into "patient-centered medical homes," one of the most promising new models for delivery of care. Right here in Rhode Island, family medicine practitioners will be envisioning—and creating—the primary-care practice models of the future.

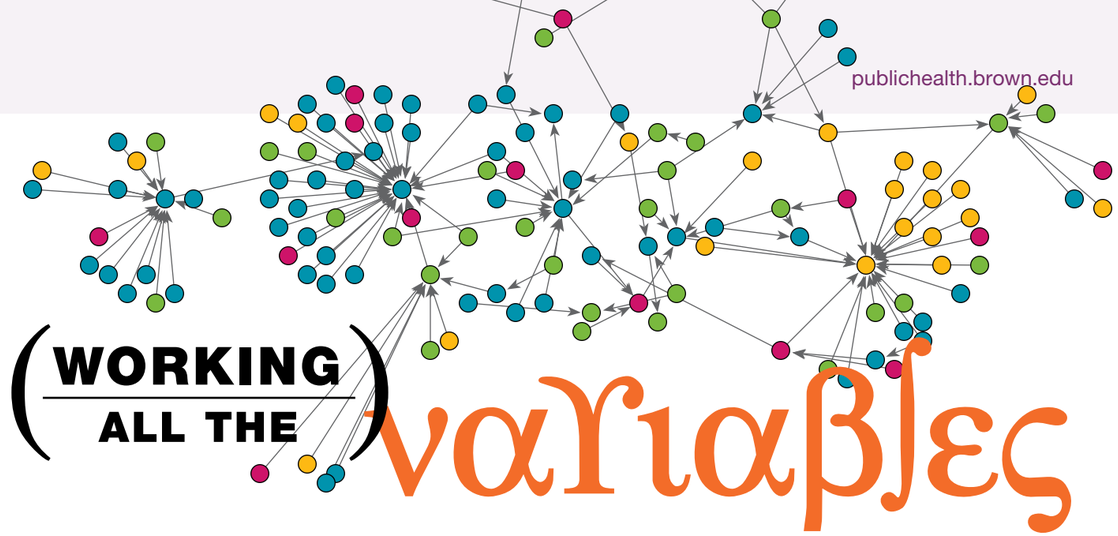
This is a time of great challenges and wonderful opportunities in the field of public health, as we identify new opportunities to promote population health. This is also a time of great excitement for us at Brown, as we develop new academic programs and experience considerable growth in research funding. Our superb new faculty will contribute to our many successes.

TERRIE FOX WETLE, PHD
ASSOCIATE DEAN OF MEDICINE FOR
PUBLIC HEALTH AND PUBLIC POLICY

Brown's Public Health Program integrates the academic, research, and public service programs relevant to population health. Ten public health centers and institutes address a broad array of health issues and conduct nationally and internationally recognized research and training aimed at improving the health of all people, in the US and abroad.

The research centers were highly productive during the past year. Grants and contracts for centers and institutes increased by more than 18 percent, to just over $55 million. Eleven new faculty were recruited, three of whom are tenure track, expanding the Program's research and teaching in epidemiology and environmental health, health services research, and behavioral sciences.

With its depth of academic offerings and research, the Public Health Program is well positioned to achieve accreditation as a School of Public Health. The Program is executing a strategic plan to accomplish this goal in the next few years. This plan includes creating four new departments—biostatistics, epidemiology, behavioral and social sciences, and health services, policy, and practice—to replace the Department of Community Health. Two undergraduate concentrations, community health and statistics, will span all four departments, offering more specialization in the area of interest. The formal University approval process for this exciting change is under way.



(WORKING ALL THE) ναγιαβλες

What exactly is biostatistics? Biostatistics creates and applies methods for quantitative research in the health sciences. Biostatisticians work with colleagues to discover patterns, correlations, and meaning in research data.

If you or someone you love were at risk for breast cancer, you would naturally want her to have the best diagnostic test, to accurately detect cancer early and optimize treatment for the best chance for survival. At the same time, you would want to minimize the suffering caused by false positive tests and subsequent unnecessary treatments. But how do we know what the best methods are?

Brown's Center for Statistical Sciences serves as the biostatistics center for the American College of Radiology Imaging Network (ACRIN), and is helping to uncover which methods of diagnostic imaging and image-guided therapeutic technologies are best for cancer patients. The Center's director, Constantine Gatsonis, served as chief statistician on ACRIN's landmark study that found digital mammography detects breast cancer in younger women better than the traditional mammogram.

Founded in 1995, the Center for Statistical Sciences fosters research and statistical education at Brown and has grown to include more than 40 faculty members. The Center continues to grow through expansion of its research efforts. For example, with colleagues at other institutions, the Center received a Grand Opportunities grant for comparative effectiveness research on advanced cancer imaging.

The work of the Center is quite varied. The Center is the biostatistics core for the Brown/Lifespan Center for AIDS Research and faculty, with leadership from senior member Joseph Hogan, have become invested in international health, primarily through collaborations with researchers in East Africa. These projects involve analysis of data from more than 100,000 individuals receiving HIV and primary care in western Kenya. Zhijin Wu studies statistical methods for analyzing the genetic information generated by high-throughput biotechnologies, such as microarrays. Crystal Linkletter uses global positioning system (GPS) technology and data from social network studies to develop statistical methods to study topics such as exposure to lead paint, the role of contacts in the spread of infectious diseases, and how reputational networks influence service design and outcomes. And Hernando Ombao develops methods for the analysis of complex data from studies of brain connectivity and function.

So what is biostatistics? A fascinating field that is improving population health by assisting in innovative study design and developing new strategies for analyzing and interpreting biomedical research data.

CONSTANTINE GATSONIS, PROFESSOR OF MEDICAL SCIENCE
JOSEPH HOGAN, PROFESSOR OF MEDICAL SCIENCE
ZHIJIN WU, ASSISTANT PROFESSOR OF MEDICAL SCIENCE
CRYSTAL LINKLETTER, ASSISTANT PROFESSOR OF COMMUNITY HEALTH
HERNANDO OMBAO, ASSOCIATE PROFESSOR OF COMMUNITY HEALTH

With no boundaries separating the components of the Division of Biology and Medicine, researchers are encouraged to exchange ideas and find exciting new linkages. This approach is particularly important for complicated, multi-faceted diseases such as addiction and cancer, where genes, environment, and behavior are all in play.

These pages show how faculty in the Division confront our most pressing health problems from all sides—at the lab bench, at the bedside, at the population level. The next generation of scientists, physicians, and public health professionals are taught to work the same way. The result? New ways to prevent and cure disease.

THE BIG C

When you have a problem as big as cancer, your only hope to defeat it is to attack at all angles. In addition to providing world-class clinical care, Division faculty use the latest molecular biology and genetics techniques to tease out more clues about cancer—what causes it, why does it happen, how can we cure it? And as more lives are saved, a new generation of public health researchers is learning how to support those who have survived.

BIOLOGY

Susan Gerbi, PhD

George Eggleston Professor of Biochemistry

Susan Gerbi's long and distinguished research career on how DNA replication is initiated has implications for understanding the role of hormones in certain cancers. She and co-principal investigator Assistant Professor of Medical Science Alexander Brodsky have funding from the Susan G. Komen Foundation for research on the role of estrogen in breast cancer gene amplification. This grant aims to explain how estrogen may directly regulate re-replication in breast cancer cells.

BIOLOGY

Carmen Marsit, PhD

Assistant Professor of Pathology and Laboratory Medicine

Carmen Marsit investigates gene-environment interactions and their individual and combined impact on human disease, with a particular focus on two biologic processes: carcinogenesis and human development. Part of Brown's Superfund Research Program, Marsit studies changes to epigenetic markers, which may be responsible, in large part, for cancer, adverse pregnancy outcomes, and common and rare diseases of childhood. Marsit, with principal investigator Professor of Community Health Karl Kelsey, is also studying the molecular epidemiology of bladder cancer.

MEDICINE

Doug Hixson, PhD

Professor of Medicine (Research) and Pathology and Laboratory Medicine (Research)

In 2002, Doug Hixson became principal investigator of an $8.2 million COBRE grant to establish the Center for Cancer Research Development at Rhode Island Hospital (CCRD). The CCRD received a five-year renewal grant of $11.2 million in 2009. The Center's mission is to create, interpret, and apply new knowledge based on original, collaborative, multidisciplinary laboratory studies to uncover the cellular and molecular pathways leading to gastrointestinal cancer arising in the liver, intestine, pancreas, and colon.

MEDICINE

Peter Quesenberry, MD

Paul Calabresi, MD, Professor of Oncology

Peter Quesenberry is principal investigator of an $11 million, five-year Center of Biomedical Research Excellence (COBRE) grant from the National Center for Research Resources of the National Institutes of Health for the development of a major stem cell research center at Rhode Island Hospital. The research will lead to a better understanding of stem cell biology and identify unique approaches to tissue regeneration in lung and marrow diseases. The goal is to translate basic stem cell studies into clinical trials on tissue restoration or correction in patients with chronic obstructive lung disease and malignant blood diseases.

PUBLIC HEALTH

Bernadine Pinto, PhD

Professor (Research) of Psychiatry and Human Behavior

As a faculty member in the Public Health Program's Centers for Behavioral and Preventive Medicine, Bernadine Pinto studies health behavior change among oncology patients. Her research focus is on exercise promotion and cancer survivorship, and she has received funding from the NIH, American Cancer Society, and Lance Armstrong Foundation for intervention trials with young adult cancer survivors. One recent $1.5 million grant from the National Cancer Institute uses community volunteers to promote physical activity among cancer survivors.

ADDICTION AND BEHAVIORAL MEDICINE

Today, the leading causes of mortality and morbidity are diseases that can be prevented by healthful choices. Behavioral medicine is just one example of how Brown researchers take on a problem. Their work ranges from how the brain becomes addicted to how to motivate people to exercise. The common goal? Change behaviors that do harm.

BIOLOGY

Eduardo A. Nillni, PhD
Professor of Medicine (Research) and Molecular Biology, Cellular Biology and Biochemistry (Research)

An expert in the molecular mechanisms that underlie obesity and energy metabolism, Nillini led research that found that inhibiting the Sirt1 enzyme in the brain appears to help control food intake. This discovery and others in Nillni's lab may someday lead to treatments that will keep people thinner.

PUBLIC HEALTH

Bess Marcus, PhD
Professor of Medical Science, and Director, Institute for Community Health Promotion

Bess Marcus is a clinical psychologist who has spent the last 20 years conducting research on physical activity behavior and has published more than 150 papers and book chapters as well as three books on this topic. She has developed a series of assessment instruments to measure psychosocial mediators of physical activity behavior and has also developed low-cost interventions to promote physical activity behavior in community, workplace, and primary care settings.

MEDICINE

Dale Bond, PhD
Assistant Professor (Research) of Psychiatry and Human Behavior

Dale Bond, whose research focuses on the behavioral aspects of bariatric surgery, is working on a NIDDK-funded project with the goal of improving outcomes for inactive bariatric surgery patients by increasing their physical activity.

BIOLOGY

Julie Kauer, PhD
Professor of Neuroscience

Julie Kauer's lab was one of the first to examine the relationship between synaptic plasticity in the brain — the strengthening or weakening of connections between neurons — and drugs of abuse. Her work has explained how the brain changes when exposed to addictive substances, and may ultimately reveal targets for therapies to combat addiction. Her research is supported by the National Institute on Drug Abuse at the National Institutes of Health.

PUBLIC HEALTH

Rena Wing, PhD
Professor of Psychiatry and Human Behavior and Director, Weight Control and Diabetes Research Center at Brown and Lifespan

Rena Wing, a world-renowned obesity researcher, focuses on the importance of behavior in weight control. She is the principal investigator behind six new research grants worth more than $12 million from the National Institutes of Health. Research will focus on healthy eating, exercise, and modifying behavior to promote weight loss and maintenance.

PUBLIC HEALTH

Peter Monti, PhD
Donald G. Millar Distinguished Professor of Alcohol and Addiction Studies and Director, Center for Alcohol and Addiction Studies

Brown's Center for Alcohol and Addiction Studies promotes the identification, prevention, and effective treatment of alcohol and other drug use problems through research, education, training, and policy advocacy. Monti is also director of the new Alcohol Research Center on HIV, launched with a five-year, $7.5 million grant from the National Institutes of Health to study the health effects of drinking with HIV.

Program in Biology Grants

Professor of Medical Science **Walter Atwood** will lead research efforts for a five-year, **$6 million** National Institutes of Health program project grant to **determine how the JC virus, which can cause a rare brain disease known as PML,** attaches to host cells.

Assistant Professor of Neuroscience **Gilad Barnea** was awarded a **$1.3 million** EUREKA (Exceptional, Unconventional Research Enabling Knowledge Acceleration) grant from the National Institute of Mental Health to develop a **method for selectively monitoring the activation of each of the five dopamine receptors in the brain** without interference from the others.

Professor of Medical Science **Michael McKeown** will launch the Howard Hughes Medical Institute (HHMI) Fellows Program to give rising sophomores and juniors a chance to conduct group research in a laboratory setting. HHMI awarded Brown a **$1 million** grant to fund this **summer research program and to create three new undergraduate science courses.**

Brown University and IBM opened a multi-million dollar supercomputer at Brown's Center for Computation and Visualization to advance genomics, investigation of the mechanics of human and animal movement, and exploration of the web of animal life and ocean ecosystems. The National Science Foundation awarded Brown a **$1 million** grant for **additional hardware for the supercomputer cluster.**

Professor of Medical Science **John Sedivy** and **Peter Adams** of University of Glasgow were given a **$1.2 million** grant from the National Institute on Aging and the UK's Biotechnology and Biological Sciences Research Council to **study a new biological theory of aging,** part of a new transatlantic agreement that is the first of its kind. The agreement funds research on the biology of the aging process.

Program in Biology Honors and Awards

Stephen T. Olney Professor of Natural History and Professor of Biology and Environmental Studies **Johanna Schmitt** was **elected a fellow of the American Academy of Arts and Sciences.**

The Journal of Immunology

Associate Professor of Molecular Microbiology and Immunology **Laurent Brossay** was invited to be **section editor of the *Journal of Immunology.***

Program in Biology Publications

Nature
Assistant Professor of Biology **Richard Bennett** and his team discovered that *Candida albicans,* a **human fungal pathogen that causes thrush and other diseases,** pursues same-sex mating in addition to conventional opposite-sex mating.

Proceedings of the National Academy of Sciences
A magnetic pill developed by Professor of Medical Science and Engineering **Edith Mathiowitz** provides the first direct, quantitative measurements of what happens to a pill in the human stomach. The findings hold great potential for **determining the forces exerted on a pill in response to the movement of the stomach during digestion.**

Nature Structural & Molecular Biology
Manning Assistant Professor of Medical Science and Assistant Professor of Chemistry **Wolfgang Peti** and colleagues at Brown and Yale University discovered the **manner in which a key enzyme, PP1, functions in protein-protein interactions.** Erroneous PP1 regulation can cause numerous diseases, including cancer, diabetes, and Parkinson's.

Neuron
Department Chair and Professor of Neuroscience **Barry Connors,** Assistant Professor of Neuroscience (Research) **Scott Cruikshank,** and a team of researchers discovered that **pathway-specific feedforward circuits between the thalamus and neocortex** were revealed by selective optical stimulation of axons.

Alpert Medical School Grants

A five-year, **$11 million** Center of Biomedical Research Excellence (COBRE) grant was awarded to Paul Calabresi, MD, Professor of Oncology **Peter Quesenberry** to fund research that will lead to a general **understanding of stem cell biology** and identify **unique approaches to tissue regeneration in lung and marrow diseases.** The Center for Cancer Research Development at Rhode Island Hospital received a five-year, $11.2 million renewal of its COBRE grant.

The Department of Veterans Affairs has awarded more than **$7 million** to the **Center for Restorative and Regenerative Medicine,** renewing funding for another five years. The center is a collaborative effort between the Providence VA Medical Center, Brown University, and others. Researchers affiliated with the center are focused on **improving the lives of individuals with limb trauma through tissue restoration and advanced rehabilitation.**

Assistant Professor of Psychiatry and Pediatrics **Daniel Dickstein** has been awarded a five-year, **$1.87 million** grant from the NIMH's BRAINS program to identify biological and behavioral markers that influence the development of **bipolar disorder in children.**

Alpert Medical School Honors and Awards

AMERICAN ACADEMY OF FAMILY PHYSICIANS
STRONG MEDICINE FOR AMERICA

The Family Medicine Interest Group at Alpert Medical School received a 2010 overall Program of Excellence Award from the American Academy of Family Physicians for its outstanding activities in **generating interest in family medicine.**

SDBP Society for Developmental & Behavioral Pediatrics

Professor of Pediatrics and Program Director of Developmental and Behavioral Pediatrics **Pamela High** was elected **president of the Society for Developmental and Behavioral Pediatrics,** an international interdisciplinary academic organization.

DO SOMETHING! AWARDS

Will Perez '08 MD'13 was named a finalist for the Do Something! Awards. He received $10,000 in recognition of his **public health work in Haiti.**

ABO+G American Board of Obstetrics & Gynecology

Professor of Obstetrics and Gynecology **Sandra Carson** was elected **vice president of the American Board of Obstetrics and Gynecology.**

Alpert Medical School Publications

New England Journal of Medicine
Professor of Medicine **Kenneth Mayer** co-authored an article that discusses the **limited attention paid to the HIV/AIDS epidemic** in the United States. The authors believe that research tailored to specific populations is necessary to gain the understanding needed to move forward.

New England Journal of Medicine
A VA-funded study at the Providence VA Medical Center led by Assistant Professor of Neurology **Albert Lo** found that intensive therapy with specially trained personnel and newly created robotic aids **can help stroke patients regain limb movement** more than a year after the stroke occurred.

Biological Psychiatry
Assistant Professor of Psychiatry and Human Behavior **Audrey Tyrka** was the lead author of a study that determined that children who suffer physical or emotional abuse may be faced with accelerated cellular aging as adults.

Health Affairs
Assistant Professor of Medicine (Research) **Amy Nunn** and researchers from Brown and the Harvard School of Public Health found that Brazil's push for inexpensive HIV and AIDS treatments **has helped contain the virus** during the past 20 years.

Public Health Program Grants

NATIONAL INSTITUTES OF HEALTH

Stephen McGarvey, director of the International Health Institute and professor of community health and anthropology, received a five-year, **$5.2-million** National Institutes of Health grant to conduct **detailed genotyping of thousands of adults in Samoa.** He will study whether Samoans have genes that make them vulnerable to obesity and diabetes.

NATIONAL CANCER INSTITUTE

Belinda Borelli, professor of psychiatry and human behavior (research), received a **$2.4 million** grant from the National Cancer Institute to study strategies for **motivating smokers with mobility impairments to quit smoking.**

Public Health Program Honors and Awards

NATIONAL INSTITUTES OF HEALTH

Professor of Sociology and Community Health **Mary Fennell** was awarded the **National Institutes of Health 2009 Director's Award** for her contributions to community-based cancer care and research.

National Institute on Aging

Associate Dean of Public Health **Terrie Fox Wetle** was appointed to the **National Advisory Council on Aging of the National Institutes of Health.**

Public Health Program Publications

New England Journal of Medicine
Assistant Professor of Community Health and Medicine **Amal Trivedi** was lead author of a study that found that **elderly people visited their doctors less but ended up in the hospital more** often and for longer periods when faced with increased copayments.

Journal of the American Medical Association
Professor of Community Health and Medicine **Joan Teno** and her colleagues found that the **decision to use feeding tubes in patients with advanced dementia is more a matter of hospital practice** than patient preference.

Health Affairs
Professor of Sociology and Community Health **Mary Fennell** and her team determined that Hispanic elderly are more likely than white senior citizens to live in **nursing homes of poor quality.**

American Journal of Public Health
Assistant Professor of Community Health and Medicine **Mark Lurie** and an international research team found evidence **linking mining to high rates of tuberculosis** in sub-Saharan Africa. Lurie also published research in *AIDS and Behavior* challenging conventional wisdom that concurrent multiple sexual partners drive the HIV epidemic there.

Project ARISE

Rhode Island might be the smallest state, but the needs of its residents are no less great. Every year, hundreds of faculty and students from the Division of Biology and Medicine put their skills and expertise to work to serve those needs—in hospitals and clinics, of course, but in the schools as well.

Since 2006, professors from the departments of Neuroscience and Education have partnered with the Office of Continuing Education to work together on the NIH- and Rhode Island Board of Governors for Higher Education-funded Project ARISE (Advancing RI Science Education), a professional development program for Rhode Island high school biology teachers. Senior Lecturer in Neuroscience John Stein is a co-principal investigator on this project, whose goal is to provide teachers with the resources they need to implement an inquiry-based curriculum in their classroom. Numerous other Division faculty give presentations at the annual symposium, host teachers in their labs, and support the participation of their graduate students in Project ARISE.

After completing a two-week summer workshop, teachers meet monthly during the ensuing academic years to discuss successes and challenges in teaching using an inquiry-based approach. They also participate in an online professional learning community where they can access or share curricular resources, request supplies and graduate student support, and contribute to ongoing discussions between scientists, graduate students, and educators.

In addition, teachers who have completed the workshop receive support from Brown's graduate student science consultants and enjoy access to Project ARISE's Mobile Lab Program. Mobile labs include all the equipment and supplies teachers and students need to complete the laboratory exercises introduced during summer workshops. Using the mobile labs, students have conducted molecular biology experiments—studying their own mitochondrial DNA, for example, or detecting genetic modification in plants and food products. Equipment is also available for studying communication within the nervous system: students have recorded and analyzed their own brain waves, muscle activity, and eye movement.

Then, each spring, Project ARISE teachers and their students are invited to Brown University for the Nature of Discovery Symposium. Here students present results from both classroom laboratory exercises and from the independent research they've conducted using mobile lab equipment. The symposium also features seminars led by Brown faculty and postdoctoral fellows from several basic science departments in the Division of Biology and Medicine.

In 2009-2010, 45 teachers from nine districts were involved in the ARISE program, with 10 graduate students serving as science consultants.

Brown in Rhode Island

Area Health Education Center of Rhode Island (AHEC)

Based at Brown, Rhode Island's AHEC fosters academic, training, and community collaborations that improve the supply and distribution of a high quality, culturally sensitive, interdisciplinary health care work force. AHEC provides grants to students to plan and execute community health projects, such as implementing health education workshops at the YWCA and assessing the utilization of medical interpreter services.

ESCUCHE

Under an NIH grant, Women & Infants Hospital worked with Latino Public Radio to develop and evaluate a 10-week health and science literacy curriculum targeting the needs of the Latino community. Each week, Clinical Associate Professor of Obstetrics and Gynecology Pablo Rodriguez discussed health topics and answered listeners' questions. The result was increased knowledge in all content areas. A next step is to evaluate health outcomes associated with improving health science literacy on a broader scale.

Rhode Island Free Clinic

Alpert Medical School provides a consistent pool of student and physician faculty volunteers who serve Rhode Island Free Clinic. Since the clinic opened in 1999, students have worked with physicians to provide quality accessible health care for patients without health insurance.

Shape Up Rhode Island and Walk the World

In 2005 Brown medical student Rajiv Kumar founded Shape Up RI, a statewide exercise and weight loss challenge that encourages increased physical activity and better nutrition. It's now gone national with the launch of Shape Up the Nation. In fall 2009 he launched "Walk the World," a fun, six-week walking competition for children that focuses on teamwork. The program aims to help children recognize the benefits of exercise and nutrition and encourages them to establish healthy habits.

Global Health Initiative

Faculty and students across the Division of Biology and Medicine generously donate their time and expertise around the world, exemplifying Brown's commitment to service to others.

In September 2009 Brown established the Global Health Initiative, a multidisciplinary university-wide effort to reduce health inequalities among underserved populations locally and worldwide through education, research, service, and development of partnerships. The GHI focuses the energy of students and faculty on research and care of patients worldwide and coordinates all related programs across campus. Professor of Obstetrics and Gynecology and Medicine Susan Cu-Uvin was appointed its inaugural director.

The GHI promotes translational research, education, and clinical care with overseas partners in order to extend Brown's academic and community service mission around the world.

The GHI was put to an early test when the massive earthquake hit Haiti in January 2010. It was central in coordinating Brown's medical response to the Haiti crisis in collaboration with Alpert Medical School and affiliated hospitals and Brown's Office of International Affairs. Many members of the Brown medical faculty and medical students traveled to Haiti to supply medical relief.

Shortly before the catastrophe, the Medical School had developed a collaborative arrangement with students at three Haitian medical schools—the University of Notre Dame, the State Medical School, and the Quisqueya Medical School. This new collaboration will enable Haitian medical students to come to Brown for electives in ambulatory medical care, internal medicine, and infectious diseases.

In September 2010, the Brown-Haiti Medical Exchange was formally established. Alpert Medical School will collaborate with St. Damien Hospital in Tabarre, Haiti, to address the unmet need of providing domestic pediatric clinical rotations to Haitian medical students. Brown faculty will create pediatric curricula to teach a three-week academic rotation for eight Haitian medical students in spring 2011. Later in the year the program will expand, with six Alpert medical students rotating to Haiti.

To share the stories and experiences of Brown medical community members working in Haiti, the Medical School launched a website last May: http://med.brown.edu/haiti

Brown Around the World

Y.R. Gaitonde Centre for AIDS Research and Education (Y.R.G. CARE)

Based in Chennai, India, Y.R.G. CARE has been the locus of antiretroviral therapy research since 1998 and **provides clinical care to 15,000 people living with HIV/AIDS.** Research collaborations with staff have defined the natural history of HIV in southern India and delineated culturally appropriate ways to prevent transmission. This is also an important teaching center for Brown medical students.

BRIGHT Pathway

The Brown Residency International/Global Health Training (BRIGHT) Pathway is an innovative residency training program that helps **residents achieve expertise in global health and care of the underserved** globally. It is offered in the pediatrics, medicine/pediatrics combined training, and internal medicine residencies.

Vietnam Family Medicine Development Project

Brown is part of a consortium of Northeast Family Medicine departments working to establish family medicine as the core specialty for primary care in Vietnam. They have created family medicine **residency programs in eight of the nine medical schools there.** Current projects support curriculum reform, faculty training, and creation of master's and doctoral programs.

Brown-Kenya Moi Exchange Program

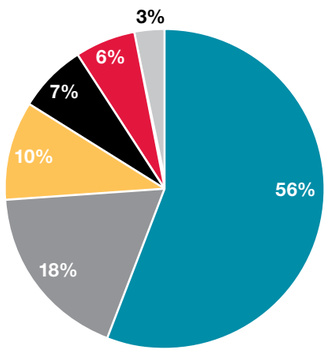
The Moi Program is a bilateral medical exchange between Alpert Medical School and the Moi University School of Medicine in Eldoret, Kenya. The program offers **opportunities for medical students, residents, and faculty** to live and work at the opposite site.

Brown/Tufts Fogarty AIDS International Training and Research Program (AITRP)

Foreign scientists train at Brown to conduct ethically sound and scientifically rigorous research related to HIV/AIDS. They become **competent independent researchers and health care leaders** who can address the HIV/AIDS epidemics in their home countries, which include India, Cambodia, Indonesia, the Philippines, Kenya, and Ghana. Its funding was recently renewed with a five-year, **$3.6 million grant.**

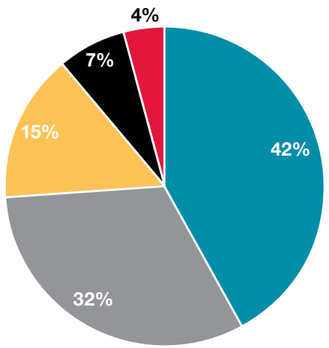
Fiscal Year 2010 was a record financial year for the Division of Biology and Medicine. Total revenues increased primarily from the success of our faculty in winning new research grants from the federal stimulus bill. Revenues from sponsored funding increased by $10.6 million, an increase of 9 percent over FY09. Expenses increased at a slower rate than revenue growth, and the Division recorded a $6.6 million surplus. The surplus has been appropriated to the Division's reserves and will serve to partially replenish our capital foundation.

FY10 Revenues (Campus)



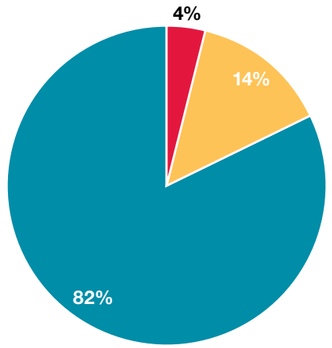
Total Revenues		$137,879,570
56%	Sponsored Funds	$76,690,274
18%	Tuition and Fees	$25,614,237
10%	Endowment Income	$13,268,475
7%	University Support	$10,165,630
6%	Fundraising and Gifts	$8,275,069
3%	Hospital Support and Other Revenue	$3,865,885

FY10 Expenses (Campus)



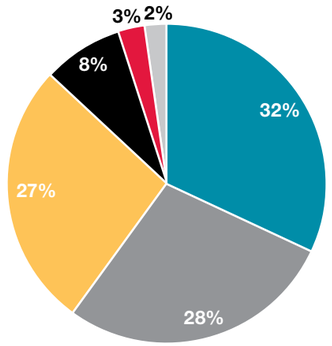
Total Expenses		$131,312,653
42%	Sponsored Funds	$55,730,684
32%	Academic Departments and Startup	$42,141,343
15%	Administration, Library and Other Costs	$19,489,132
7%	Facilities	$9,480,202
4%	Financial Aid	$4,471,293

FY10 Statement of Reserves



Total Division Reserves		$307,247,000
4%	Total Working Capital	$13,615,000
14%	Total Restricted Funds (Gifts, Endowment Yield, Grants and Contracts)	$42,023,000
82%	Endowments at Market Value	$251,609,000

FY10 Sponsored Funding (Campus and Affiliated Hospitals)



Total Sponsored Funding		$299,453,578
Total Campus Awards		**$179,680,000**
32%	Division of Biology and Medicine	$94,559,000
28%	Brown, excluding Division	$85,121,000
Total Affiliated Hospitals Awards		**$119,773,578**
27%	Lifespan (Rhode Island Hospital, The Miriam Hospital, Bradley Hospital)	$80,757,162
8%	Care New England (Women & Infants Hospital, Butler Hospital)	$23,288,579
3%	Providence VA Medical Center	$9,400,000
2%	Memorial Hospital of Rhode Island	$6,327,837

Research Space (Campus and Affiliated Hospitals) (as of January 2010)

Total Gross Square Feet			1,045,369
Division of Biology and Medicine	632,869	Women & Infants Hospital of Rhode Island	57,100
Rhode Island Hospital	225,000	Butler Hospital	26,600
The Miriam Hospital	50,000	Memorial Hospital of Rhode Island	22,000
Emma Pendelton Bradley Hospital	5,000	Providence VA Medical Center	26,800

The Division of Biology and Medicine is thankful for the remarkable generosity of its benefactors—both longstanding supporters and new donors. By giving generously to *Boldly Brown: Campaign for Academic Enrichment,* these individuals and institutions have helped propel the Division forward in bold new ways. We salute them.

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Represents all gifts paid in fiscal year 2010.

$2 million and above

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Donor Highlight: The Champlin Foundations

The new Alpert Medical School building will boast a state-of-the-art library that will give medical students access to a computer lab and a multitude of online textbooks and journals. It will also give them something they have long desired: a dedicated space to study. Rhode Island's own Champlin Foundations is helping to make that happen with a gift of $1 million to support the library.

"Although he was not a graduate of Brown, George Champlin strongly supported the University and felt its success was very important to Providence and Rhode Island," says Keith H. Lang, the Foundations' executive director. "The Medical School project was particularly of interest to the Foundations because it touches on three of our key funding priorities and areas of focus: education, health care, and libraries. In addition, it's one of the centerpieces of the new Knowledge District, which we feel is the most exciting economic development initiative currently under way in the state. We felt the new Medical School library embodies so much of what Mr. Champlin's philanthropy was all about."

Division of Biology and Medicine Faculty

- **Total Faculty: 2037**
  - Biology: 140
  - Medical School Academic: 615
  - Medical School Clinical: 1,193
  - Public Health: 89
- **Academic Departments: 20,** of which 5 are basic science departments and 15 are clinical departments.

Program in Biology

- **280 undergraduate degrees** awarded in 2010, of which 48.3% graduated with honors
- **64 graduate degrees** awarded in 2010
- **6 graduate programs:**
  - Biomedical Engineering
  - Ecology and Evolutionary Biology
  - Molecular Biology, Cell Biology, and Biochemistry
  - Molecular Pharmacology and Physiology
  - Neuroscience
  - Pathobiology
- **113 postdoctoral research associates and fellows**
- **251 graduate students**
- **$1.6 million in external funding** for graduate students from a variety of sources, including Fulbright, Fogarty, and NIH National Research Service Awards.
- **$42 million in total research awards** in FY10

Alpert Medical School

- **416 medical students**
- **89 undergraduate institutions,** 40 states, and 5 countries represented
- **725 residents and fellows in 25 residency programs**
- **38% of Rhode Island physicians were trained** at Alpert Medical School and in its residency programs
- **43% of Rhode Island physicians have a faculty appointment** at Alpert Medical School
- **5 degree programs:**
  - MD
  - MD/PhD
  - MD/MPH
  - MD/MPP (Master of Public Policy)
  - MD/MPA (Master of Public Affairs)
- **7 teaching hospitals:**
  - Rhode Island Hospital, incl. Hasbro Children's Hospital
  - The Miriam Hospital
  - Emma Pendelton Bradley Hospital
  - Women & Infants Hospital of Rhode Island
  - Butler Hospital
  - Memorial Hospital of Rhode Island
  - Providence VA Medical Center

  Together the hospitals serve 1.5 million people of diverse backgrounds.
- **Class of 2010: a snapshot**
  - 97 graduates
  - 46% women, 54% men
  - 14 underrepresented minorities
  - 10 Rhode Island natives
  - 14 entered residency programs in Rhode Island

Public Health Program

- **212 students in the Program**
  - 73 undergraduate concentrators
  - 139 graduate students
- **4 academic sections:**
  - Behavioral and Social Sciences
  - Health Services, Policy and Practice
  - Biostatistics
  - Epidemiology and Environmental Health
- **612 peer-reviewed publications, chapters, and books**
- **10 centers and institutes conduct groundbreaking research** in the areas of addiction, HIV/AIDS, global health, epidemiology, gerontology, healthy behaviors, and more
- **$55 million in external funding** was expended by the Public Health Centers and Institutes academic year 2009-2010

Office of the Dean of Medicine and Biological Sciences

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http://biomed.brown.edu

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