2010 - 2011 ANNUAL REPORT

A Day in the Life Sciences

DIVISION OF BIOLOGY AND MEDICINE

BROWN
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I invite you to experience a typical day in Brown University’s Division of Biology and Medicine.
You’ll meet physicians awake at dawn to treat their first patient, researchers who split their day between searching for tomorrow’s cures and teaching tomorrow’s scientists, and public health faculty who show us the way to improve the nation’s health.

All of them are united in support of a single mission: to understand and improve the health of individuals and populations and the environments in which they live.

The highlight of the period covered in this report, June 2010 to December 2011, was the grand opening of the Warren Alpert Medical School of Brown University’s new building. I want to convey how this new home—the Medical School’s first—has rekindled our community’s passion for learning and collaboration. This accomplishment would not have been possible without the generosity of our donors, who supported 78 percent of the project cost.

Also of note, in September 2010, Alpert Medical School signed new amendments to its affiliation agreement with Lifespan, the health care system that operates three of the Medical School’s affiliated teaching hospitals. The amendments improve joint strategic planning, expand investment in the academic medical program, and formally recognize Rhode Island Hospital as “the principal teaching hospital” of Alpert Medical School.

In the year ahead we hope to see the continued growth of our Public Health Program, as it moves toward becoming an accredited school of public health. We will bid farewell to Brown President Ruth J. Simmons, who has been a stalwart supporter of our efforts in the Division. We are excited to work with our incoming president, Christina Paxson, whose expertise in economics, children’s health, and health care policy is especially relevant to our goals.

I am proud of the faculty, students, and staff who make the Division of Biology and Medicine exceptional—24 hours a day, 7 days a week.

Edward J. Wing, MD
Frank L. Day Professor of Biology and Dean of Medicine and Biological Sciences
Brown University
A DAY IN THE LIFE SCIENCES

There’s no such thing as “business as usual” in the Division of Biology and Medicine.

Every day is different. Extraordinary. Rich with inquiry and discovery.

In these pages you will meet the people who fill each day with promise, from the moment the first patient rolls into the OR until the lights go out in the sleep lab. And you’ll see everything they do – learning, teaching, research, service – in between.
Dupuy is an interventional radiologist and a pioneer in image-guided tumor ablation, which was first developed and approved for ablation of liver tumors. Dupuy has expanded its use to treat other tumors, including lung, adrenal, kidney, thyroid, and most recently, bone. Image-guided radiofrequency ablation (RFA) uses needle-like devices that, when placed directly into tumors, can deliver microwave energies that effectively heat and kill cancerous tumors when surgery is not an option, or when the cancer has not responded to other therapy.

Image-guided ablation is also minimally invasive. There is less trauma to adjacent tissues, and the risks of infection or blood loss are much lower than with conventional surgery.

In a first-of-its-kind study, Dupuy and a team of physician researchers tested the effectiveness and safety of RFA in reducing the pain of bone metastases. Metastatic cancer of the bone is a painful condition. Many patients live with pain that can affect their mood and quality of life, and may require increasing doses of narcotics for pain management. Dupuy led a multi-center study that found that image-guided RFA is a safe and effective treatment for reducing the pain associated with bone metastases. The findings were reported in the paper “Percutaneous Radiofrequency Ablation of Painful Osseous Metastases,” which was published in the journal Cancer.

The American College of Radiology Imaging Network (ACRIN) selected this paper to receive its Publications Merit Award in 2010. The award recognizes a scientific paper published during the previous year that stands out for the caliber of the research and the research results. The paper must also advance ACRIN’s overarching goal: to disseminate scientific information that improves the length and quality of cancer patients’ lives or results in the earlier diagnosis of cancer.

“It is very gratifying to be able to expand the uses of RFA once again to alleviate pain when other means do not suffice,” Dupuy says. “That in itself is the real reward.”

Damian Dupuy heads into his first case of the day: a 75-year-old man with metastatic cancer. Dupuy will use radiofrequency ablation to kill the tumor cells. It might not cure his patient’s cancer, but it will improve his quality of life.
PHILIP GRUPPUSO, MD
Associate Dean for Medical Education and Professor of Pediatrics
A New Home for Alpert Medical School

Philip Gruppuso walks up to the podium at the front of one of the large lecture halls in the Medical School’s new building. More than 100 first-year medical students power on their iPads as the biochemistry lecture begins.

Alpert Medical School made history on August 15, 2011, when it opened the doors to its first dedicated home, a renovated factory in Providence’s historic Jewelry District. The 135,000-square-foot space has since become an energizing force for the Medical School. “The building is bringing out the best in the students and faculty,” says Gruppuso. “I feel more inspired to teach than at any other time in my career.”

Designed to strengthen the School’s sense of community, the building has at its center a three-story, glass-encased atrium that connects the two main entrances. The soaring space is a dramatic setting for a range of gatherings, from large-scale poster sessions to spontaneous conversations among faculty, administrators, and students. The building’s street-level café and plant-lined rooftop terrace were also designed with social connection in mind. But at the heart of the School’s emphasis on community is the Academy system. Students are assigned for all four years to one of three Academies, each headed by a faculty adviser and featuring its own kitchen, lockers, and study and lounge areas.

Of course, the School’s primary focus is medical education, and there is no shortage of classroom space built to support that mission. Besides the two 150-seat lecture halls, there are three case

The 1928 building was originally home to Brier Manufacturing, makers of costume jewelry.
The building is designed to foster community among students and faculty.

study rooms—one designed with adaptability in mind and no fixed furniture, and two with tiered seating to provide an ideal setting for case-based presentations. A boardroom is the perfect place for more formal gatherings, and myriad smaller rooms accommodate seminar and study sessions. The variety of spaces enables the Medical School to give its students an education that is both personalized and community focused.

Brave New World
The building's technologies are state of the art. In the lecture halls, students can call up the instructor’s lectures on their iPads (required of each student). And in the window-lined library, they use computers instead of books; the vast collection is entirely digital. The impact of these technologies is most apparent in the two spaces dedicated to clinical education: the anatomy

“The building is bringing out the best in the students and faculty ... I feel more inspired to teach than at any other time in my career.”

PHILIP GRUPPUSO
Associate Dean for Medical Education and Professor of Pediatrics
suite and the clinical skills simulation center. In addition to providing ample space for dissection and prospection, the 10,000-square-foot anatomy suite contains stations for reviewing x-rays and other digital imaging, which “streamline and enhance the entire process,” says Morphology Course Director Dale Ritter.

In the clinical skills area, students’ interactions with patient actors, which occur in realistic examination rooms, are video recorded and can be viewed in real time and reviewed later. With this technology, instructors and students are able to analyze these important exchanges.

The Medical School community has only begun to devise ways to use the new space and technology to its full educational potential. What is clear is that the building has forever changed Alpert Medical School: it now has a visible identity—a space that raises its profile, enhances its strengths, and, finally, is equal to the quality of its students and faculty.

Meanwhile … in the Anatomy Suite

We’re All Getting Older

First-year medical students are in the Anatomy Lab with Morphology Course Director Dale Ritter, PhD. Today, geriatricians will spend 30 minutes at each dissection table to look at the cadaver’s anatomy and determine how factors of aging and disease affected the individual.

Geriatricians work with students several times during the Anatomy course as part of the Medical School’s comprehensive and groundbreaking emphasis on aging. With the mantra “every student, every course, every year” and a $2-million grant from the Donald W. Reynolds Foundation, Alpert Medical School has integrated content on aging into its entire curriculum, from first-year lectures through continuing education.

In a 2011 paper in the journal Gerontology and Geriatrics Education, the architects of the reform argue that Brown demonstrates that thorough integration of aging-related content across an entire medical curriculum is possible. “Aging cuts across all medical disciplines except pediatrics and obstetrics, and therefore merits inclusion in all aspects of medical education,” says Richard W. Besdine, MD, David S. Greer, MD, Professor of Geriatric Medicine, and professor of medicine and of health services, policy and practice. Besdine, who is also director of the Division of Geriatrics and Palliative Medicine and former dean of medicine and biological sciences, led the team that implemented these sweeping changes.
Why Do We Age?

Researchers Stephen Helfand, John Sedivy, Marc Tartar, Robert Reenan, Qian Chen, Nicola Neretti, and Jill Kreiling gather for one of their recurring meetings. The perennial topic? Changing how we age.

People have never lived so long. In the 20th century alone, life expectancy in the US and Europe rose by more than 25 years. Now, even more important than lifespan is the concept of healthspan—survival into very old age in the absence of major disability.

At Brown, a close-knit group of prominent faculty is working across areas of expertise to understand healthspan. “The term ‘lifespan’ has sometimes been misinterpreted to imply that our research [only] aims to extend life,” says Stephen Helfand.

The group is working to identify biological mechanisms that can extend healthy life. Specifically, they are investigating the molecular mechanisms of insulin signaling, sirtuins (a recently discovered family of proteins that may regulate aging), and calorie restriction. They are also exploring brand-new areas, such as the relationships between epigenetics (changes in the genome that are acquired during a person’s lifetime) and aging. In the summer of 2011, Nicola Neretti and Helfand published in Aging a new mathematical algorithm that allowed them to track specific genes related to aging in both insects and mammals. Among their findings: calorie restriction and the compound resveratrol seem to operate similarly on genes in both kinds of creatures. Along similar lines, Jill Kreiling and John Sedivy described in Aging Cell novel age-associated epigenetic changes taking place in several mammalian tissues.

“The ultimate goal is to apply this new knowledge to develop interventions for delaying the deleterious changes of aging,” says Helfand.

A Subject That Never Gets Old

The group has also brought together top aging experts and expanded Brown’s educational offerings in the field. They’ve established a new seminar series on the biology of aging. Lecturers have included Gary Ruvkun, of Harvard Medical School; Martin Lotz, of Scripps Research Institute; and David Sinclair, discoverer of resveratrol, also from Harvard.

Also, in the fall of 2011, Brown announced the launch of the Molecular Biology of Aging (MBoA) track within the graduate program in Molecular Biology, Cell Biology, and Biochemistry. Headed by Sedivy, MBoA was made possible by a T32 grant from the National Institute on Aging. It will bring together molecular biologists, computational and population biologists, and geriatricians to help new scientists understand—and eventually transform—the biology of aging.
front row:

STEPHEN HELFAND, MD
Professor of Biology

JILL KREILING, PHD
Assistant Professor (Research) of Biology

middle row:

QIAN CHEN, PHD
Michael G. Ehrlich, MD, Professor of Orthopaedic Research

ROBERT REENAN, PHD
Professor of Biology

back row:

MARC TATAR, PHD
Professor of Biology

JOHN SEDIVY, PHD
Hermon C. Bumpus Professor of Biology and Professor of Medical Science

NICOLA NERETTI, PHD
Assistant Professor of Biology
Improving the Long-Term Care System

At the Center for Gerontology and Healthcare Research, Vincent Mor, Susan Miller, and Zhanlian Feng are meeting to discuss the conclusion of the grant they’ve worked on together for five years: Shaping Long-Term Care in America. Their work has yielded important policy implications.

Given that the proportion of the population aged 65 and older is expected to double by 2030, this research is critical to finding how best to meet the growing needs in public health, aging services, and health care systems. In 2011, the researchers published a number of studies that reveal troubling trends and made recommendations for policy changes to improve long-term care.

In one study, they looked at nursing home closures between 1999 and 2008. Published in the *Archives of Internal Medicine*, the paper showed that closures were concentrated disproportionately in poor, urban, and predominately minority neighborhoods. The result? Poor and urban people, particularly minorities, will have fewer choices for the long-term care they need, says Vince Mor, a senior author.

But there’s a moral dilemma. “If the local nursing home is closed because their quality is so poor, that’s good, but the cost of that closure is disproportionately borne by a community. How much do you invest in a failing facility ... without rewarding a bad actor who runs a lousy place?” Mor says.

Susan Miller was lead author on another study, published in the
The idea seemed simple: give antiretroviral therapy to people with HIV when they are still at a higher level of health, and you’ll reduce new infections and lengthen thousands of lives. But Assistant Professor of Epidemiology Mark Lurie had to prove it.

In 2009, the World Health Organization recommended that people start antiretroviral therapy when a key measure of immune system strength, the CD4+ cell counts, reaches a concentration of 350 per microliter of blood. South Africa—the country with the most people living with HIV/AIDS in the world—stuck with the old standard of waiting until only 200 cells per microliter remain, reflecting a more compromised immune system.

In a study published in July 2011 in *PLoS One*, Lurie says, “We used a mathematical model to predict the impact of adopting the new WHO guidelines on HIV prevalence, incidence, and cost … It would require, over five years, an additional 7 percent investment, resulting in 28 percent more patients receiving HIV treatment. After 16 years, the cumulative net costs reach a break-even point.”

A month later, the South African government decided to adopt the WHO guidelines, a move that Lurie found could save more than 120,000 life-years by 2040.

**HIV Treatment: Sooner Is Better**

**At Home and Abroad**

The US is not alone in grappling with how to meet the needs of an aging population. The researchers also have grant funding to study the long-term care system in China.

Zhanlian Feng found that the nursing home industry is booming there as a rapid increase in its elderly population forces a nationwide shift from family care to institutional care. The study, published in the *Journal of the American Geriatrics Society*, found that while the government encourages development of long-term care facilities, it offers little oversight.

“When I talk to officials I get the impression that they know there is a huge challenge and that the aging wave is coming. So they say, ‘Let’s build more beds first. Quality? Problems? We’ll worry about that later.’ That worries me,” Feng says.

*American Journal of Alzheimer’s Disease and Other Dementias*, that was the first to estimate the proportion of people who die in nursing homes with dementia, an important indicator of the prevalence of the condition in nursing homes. She found that more residents with dementia are seeking hospice care and using it longer, on average.

“Ideally, the higher the proportion of people with dementia who are in hospice care the better, because many studies have shown a benefit. But the issue is the cost and the length of stay,” says Miller.

The researchers hope the data will help policymakers preserve the hospice benefit even as they seek to control Medicare costs.
Decoding the Family Tree

When it’s time to break for lunch in Providence, it’s just after 2 p.m. in Greenland, where Casey Dunn is part of a research expedition. He and his team are on the hunt for extremely rare animals that can be found nowhere else in the world, including one species that is found in only a single remote spring.

Dunn is equal parts field scientist, bench researcher, and computer wonk. His focus is evolution—specifically, how it has produced the diversity of species on earth. His tools are sophisticated genomic and computational techniques that help us understand how complex multicellular organisms, including humans, were formed.

And he’s creating these tools as fast as the technology will allow. Using new approaches to analyze a large number of genes from a large number of animals, Dunn led an international research team that helped redraw the animal family tree, which resulted in a paper in *Nature*. In 2011, with researchers from Brown and collaborating institutions, he pieced together the most comprehensive phylogeny, or evolutionary tree, for mollusks. The results, too, which revealed some surprises about this 500-million-year-old group of animals, were published in *Nature*.

Impressive, right? But there’s also the Waterman Award.

Extremely Talented and Incredibly Young

The National Science Foundation’s Alan T. Waterman Award recognizes an outstanding young researcher in any field of science or engineering supported by the National Science Foundation. In addition to a medal, the awardee receives a grant of $500,000 for scientific research. There’s a catch, however: the recipient must be 35 years of age or younger or not more than seven years beyond the receipt of their doctoral degree.
When Casey Dunn was selected in 2011, he was the first-ever Waterman Award recipient from Brown.

NSF Director Subra Suresh describes Dunn as just the kind of outstanding young researcher the award is meant to recognize. “His research has already made substantial contributions to our understanding of the origins of a diversity of life. His insights should further this important field of study in the years to come.”

The $500,000 grant (over three years) came just in time for Dunn and his team. They had a “shovel-ready project” to collect siphonophores, which live at great depths in the open oceans. “I’m really excited because with this award I can go after some animals that I would not have been able to get otherwise,” says Dunn, whose collection expeditions may include waters off the coast of France and in the Pacific Ocean.

This interdisciplinary research requires fieldwork at remote locations to collect specimens, new laboratory-based tools for collecting genome data, and large analyses by supercomputer. Dunn’s work will be facilitated by recent investments Brown has

“[Casey’s] research has already made substantial contributions to our understanding of the origins of a diversity of life. His insights should further this important field of study in the years to come.”

SUBRA SURESH
Director, National Science Foundation
made to upgrade DNA sequencing tools and its scientific computing infrastructure. That includes the IBM supercomputer that was installed on campus in 2009, and upgrades to high speed data connections between Providence’s Knowledge District, where the sequencer is located, and Brown’

MEANWHILE ... IN SIDNEY FRANK HALL

A Promising Treatment

Boys who have Duchenne muscular dystrophy are destined for a terrible fate: around preschool age, their muscles begin to weaken, leaving them wheelchair-bound by adolescence. Gradually, even the muscles needed to breathe seize. Their life expectancy is 25.

Justin Fallon, PhD, professor of neuroscience, is determined to change their destiny. For more than a decade he has researched how a protein called biglycan, which occurs naturally in the body, can activate a pathway that can stand in for the protein that boys with Duchenne are unable to produce. Fallon is developing a treatment that seeks to use recombinant human biglycan (rh-BGN) to recruit the compensatory protein—utrophin—to the muscle cell membrane, resulting in reduced muscle damage and improved function.

Today, Fallon is chairing a meeting of the scientific advisory board for his NIH translational research grant. Brown has granted an exclusive license for the rh-BGN treatment to Tivorsan, a startup firm that will strive to see the treatment through human trials.

“At this point we cannot say how effective biglycan will be in humans. However, the results from the mouse studies are encouraging,” says Fallon, who is affiliated with the Brown Institute for Brain Science.

“We are seeking an effective treatment that gives boys a better quality of life for years. We hope to prolong the time they can walk without assistance and perform the activities they enjoy doing most.”
In April 2011, Brown faculty voted unanimously in favor of creating four new departments within the Public Health Program: Epidemiology; Behavioral and Social Sciences; Health Services, Policy and Practice; and Biostatistics. Previously sections within the Department of Community Health, these departments are now the Program’s cornerstones, each chaired by a nationally renowned scholar.

The creation of the departments is part of a larger movement. Since the Program’s founding in 2000, Brown has made public health a priority, building areas of strength and engaging in strategic growth and investment. The ultimate aim of these efforts—establishing an accredited School of Public Health—is now within sight. Today, the Program boasts 80 undergraduate concentrators, 99 master’s students, and 43 doctoral students. Its faculty roster, which now exceeds 100, includes numerous distinguished researchers, such as Professor David Savitz, a world-renowned expert in perinatal and pediatric health, who came to Brown in 2010.

Dean Terrie Fox Wetle and the chairs of the Public Health Program’s four newly formed departments are between meetings. They take a moment to enjoy the view on the terrace of public health headquarters at Brown.

The 11-story Public Health building sits between the Brown campus and the Medical School just across the river.
left to right:

**CHRISTOPHER KAHLER, PHD**
Chair and Professor of Behavioral and Social Sciences

**IRA WILSON, MD, MSC**
Chair and Professor of Health Services, Policy and Practice

**STEPHEN BUKA, SCD**
Chair and Professor of Epidemiology and Mittleman Family Director of the Center for Study of Human Development

**TERRIE FOX WETLE, PHD**
Associate Dean of Medicine for Public Health and Public Policy

**CONSTANTINE GATSONIS, PHD**
Chair of Biostatistics and the Henry Ledyard Goddard University Professor of Biostatistics
Exploring Together

Research and initiatives developed at Brown are the fruits of collaborative, multidisciplinary efforts: the Public Health Program, like the University, is recognized for innovation that steps outside the boundaries of a more traditional academic approach. Studies and strategies have real impact on people’s lives, locally and around the globe. Home to the only graduate public health program in the state, Brown works closely with Rhode Island agencies and health care facilities on important health policies and issues, from industrial pollution to health insurance. For example, due in part to strategies developed with Brown faculty, Rhode Island’s immunization coverage during the 2009 H1N1 influenza outbreak was the best in the nation, according to the Centers for Disease Control and Prevention.

On a larger scale, Program studies include the National Lung Screening Trial, a massive government-funded study that Constantine Gatsonis helped lead. The trial confirmed in 2011 that helical low-dose CT scans for lung cancer reduce deaths in heavy smokers by 20 percent compared to x-ray scans. And the Program’s efforts extend beyond the border. Internationally, Brown’s work—in Samoa

“The ability to educate and to conduct research across many fields distinguishes Brown, and it will be the hallmark of the School of Public Health ... As an accredited school, we will be better positioned to develop local, national, and international collaborations that address important public health challenges.”

TERRIE FOX WETLE
Associate Dean of Medicine for Public Health and Public Policy

A Public Health Program study tests whether hosting a fresh produce market within workplaces will motivate employees to eat more fruit and vegetables.
Get the Lead Out

Patrick Vivier, MD, PhD, director of Brown’s Master of Public Health Program, led efforts to plot lead poisoning data from across Rhode Island between 1993 and 2005.

The findings, published in 2010 in Maternal and Child Health Journal, were surprising. During that 12-year period, some census blocks in the state had no cases of poisoning in the study group of 204,746 children, while in the hardest hit census blocks of Providence, Pawtucket, Central Falls, Woonsocket, and Newport, lead poisoning afflicted as many as 48.6 percent of kids under 6.

“We know there are disparities,” says Vivier, “but to look at zero cases in some areas and almost 50 percent in some areas is still shocking.”

By mapping cases of lead poisoning, the researchers have been able to help aim cleanup resources at the areas where they will do the most good.
ERIC MORROW, MD, PHD
Assistant Professor in the Department of Molecular Biology, Cell Biology and Biochemistry
The Autism Mystery

In his Knowledge District laboratory near downtown Providence, Eric Morrow is running DNA samples through a high-throughput gene sequencer. A neurodevelopmental biologist and geneticist, he’s looking for the molecular disturbances that alter the developing brain and give rise to disorders of cognitive development.

These disorders, such as intellectual disability and autism, are leading causes of lifelong disability. Morrow’s long-term research goal is to establish a foundation for improved genetic diagnosis and treatment designed to enhance cognitive and functional gains for patients.

Morrow approaches the problem from both the molecular and the clinical levels. He and his clinical colleagues at the Emma Pendleton Bradley Hospital, a children’s psychiatric hospital affiliated with Alpert Medical School, have established the Developmental Disorders Genetics Research Program. Since 2009, they have been recruiting families from Rhode Island and around the world who are affected by developmental brain disorders to take part in research studies. They use novel genomic methods such as microarrays and high-throughput genome-wide sequencing methods to discover gene mutations.

Thanks to worldwide networks of patients and health care systems, sharing and comparing data internationally is possible. “Sometimes a genetic variant found in a family in Rhode Island may only be replicated in another distinct family found across the world,” Morrow says. Occasionally, when funding permits, he and his team are known to take a road trip to visit these families with rare and interesting genetic changes. Documenting these variants in multiple subjects strengthens the evidence that the genetic changes cause the cognitive disorder.

Eric Morrow works with post-doctoral scholar Ece Gamsiz on genome sequencing.
Of Mice and Stem Cells

Once back in the lab, Morrow and colleagues model the effects of genetic mutations on neuronal differentiation and development. With Manning Assistant Professor of Biology Mark Zervas, PhD, a nationally recognized researcher in mouse genetic engineering, Morrow has engineered mouse mutations in Brown’s Transgenic Mouse Core Facility. In addition, Morrow’s lab has recently begun to use exciting new induced pluripotent stem cell technologies, which enable researchers to reprogram somatic tissue, such as peripheral blood, from patients to form stem cells. These human stem cells are then differentiated in the lab into human neurons. He hopes that they may soon be able to add exogenous factors or small molecules to treat the cellular changes that they see.

“If we notice an abnormality in axon growth in the patient-derived cells, is there an exogenous molecule that we can add to the culture to ‘treat’ the cellular problems we see? Naturally, such a molecule or treatment may then be extended to our patients,” Morrow says.

Head of the Class

In 2010–2011, the American Association for the Advancement of Science (AAAS), the world’s largest general scientific society, named as fellows three Brown biomedical faculty members, and the American Academy of Arts and Sciences elected to fellowship one.

Election as a fellow is an honor bestowed upon AAAS members in recognition of their scientifically or socially distinguished efforts to advance science or its applications. In 2010, the AAAS honored Edward Hawrot, associate dean for the Program in Biology and Alva O. Way University Professor of Medical Science; Agnes Kane, professor of medical science and chair of Pathology and Laboratory Medicine; and Gary Wessel, professor of biology.

Also in 2011, John Donoghue, Henry Merritt Wriston Professor and director of the Brown Institute for Brain Science, was elected to the American Academy of Arts and Sciences. The Academy honors leading thinkers in scholarship and science, public affairs and business, and the arts and humanities.
Alcohol/HIV: Double Trouble

Colleagues from medicine and public health meet to discuss their research. They are working from both prevention and treatment perspectives to address the difficulties at the intersection of alcohol and HIV.

In 2010, Brown received a $7.5 million, five-year grant from the National Institutes of Health to study alcohol consumption and HIV and establish the Alcohol Research Center on HIV (ARCH). Located with Brown’s Center for Alcohol and Addiction Studies (CAAS), ARCH investigates the health effects of drinking with HIV and provides doctors and patients with the latest recommendations.

“Alcohol can produce many unique complications and risks in the life of an HIV-positive person,” says Peter Monti, ARCH’s director. Monti, a recipient of the Research Society on Alcohol’s Distinguished Researcher Award, received the Association for Behavioral and Cognitive Therapies’ Addictive Behavior Lifetime Achievement Award in 2011.

With multiple investigators across seven studies, ARCH brings together researchers in public health and medicine to study both biology and behavior. For example, as director of ARCH’s virology core, Bharat Ramratnam conducts research that is designed to be translated from the lab to the clinic. He works to quantify levels of HIV-1 burden in study patients and to determine the effect of alcohol on direct and indirect markers of viral replication. He also conducts proteomic and genomic studies on patients to determine which HIV-1-related host genes are affected by alcohol. Other ARCH studies focus on improving treatments and changing behaviors: Monti and Christopher Kahler worked to develop an intervention for heavy drinkers with HIV. In another study, Monti, Suzanne Colby, and others collaborated on the first-ever emergency room intervention that addresses both alcohol and sex risk.
Their discussion will focus on pursuing research related to a recent groundbreaking innovation: the first-ever artificial ovary, which they developed as a team. Named by *Time* magazine as a 2010 “Top 10 Medical Breakthrough,” the ovary can grow oocytes, or egg cells, into mature human eggs in the laboratory and provides a potentially powerful new means of conducting fertility research. The organ was first described in 2010 in the *Journal of Assisted Reproduction and Genetics*, with Stephan Krantz (a former fellow in Carson’s lab) as lead author.

“An ovary is composed of three main cell types, and this is the first time that anyone has created a 3D tissue structure with triple cell line,” says Carson.

The artificial ovary represents the kind of innovative, collaborative work for which Brown is known. The two researchers were at first working separately, but—unknownst to them—in concert: Morgan was developing 3D Petri dishes, which are made of a moldable gel that provides a nurturing template to encourage cells to assemble into specific shapes ... such as a 3D ovary. Meanwhile, Carson was working to create an environment in which she could study how supportive cells in the ovary and oocytes interact. When she learned of Morgan’s 3D Petri dishes her goal became more ambitious, and the two began to collaborate on creating an organ. ▶
SANDRA CARSON, MD
Professor of Obstetrics and Gynecology and Director of the Division of Reproductive Endocrinology and Infertility at Women & Infants Hospital

JEFFREY MORGAN, PHD
Associate Professor of Medical Science and Engineering and Co-Director of the Center for Biomedical Engineering
To build the ovary, they first formed honeycombs of theca cells, one of two key types in the ovary, donated by reproductive-age patients at Women & Infants Hospital. Together with human egg cells, donated granulosa cells were inserted into the honeycomb shape the theca cells formed. In days, the theca cells enveloped the granulosa and eggs, mimicking a real ovary. The big test, however, was whether the structure would function like an ovary—namely, to mature eggs. It did: in experiments, the structure was able to nurture eggs from the “early antral follicle stage” to full maturity.

“This represents the first success in using 3D tissue engineering principles for in vitro oocyte maturation,” the researchers wrote in the journal article.

These images show the maturation of the oocytes within the ovary. One of the oocytes, seen in the final panel, shows extrusion of a polar body.
The Future Is Now

Carson and Morgan are now embarking on the very studies Carson dreamed the ovary would make possible. The organ not only provides a living laboratory for investigating fundamental questions about how healthy ovaries work, says Carson, but it is also a test bed for understanding how problems such as exposure to toxins or other chemicals can disrupt egg maturation and health.

Clinically, the artificial ovary could play a significant role in the future—in preserving the fertility of cancer patients, for example: immature eggs could be salvaged and frozen before chemotherapy or radiation, and then matured outside the patient in the artificial ovary.

The success of the artificial ovary bolstered prospects for Morgan’s 3D Petri dish, too. Morgan has founded a startup company, MicroTissues Inc., based in Providence’s burgeoning Knowledge District. The company sells the micro-molds to researchers looking to engineer 3D tissues. Universities around the world—from Brown to the University of Hong Kong to the Max Planck Institute in Germany—are using the molds for cancer research, stem cell biology, tissue engineering, and more.

Genetic Biopsy

In a second physician-biologist collaboration aimed at improving fertility, Sandra Carson worked with Gary Wessel, PhD, professor of biology, to examine the genetic makeup of individual eggs.

Together with colleagues, the duo developed a way to extract information about gene expression from fertile human egg cells without hurting them. The team of physicians and biologists was able to sequence the transcribed genetic material, or mRNA, in egg cells and, in a scientific first, in smaller structures pinched off from them called “polar bodies.” By comparing the gene expression sequences in polar bodies and their host eggs, they were able to determine that the polar bodies offer a faithful reflection of the eggs’ genetic activity. The findings were published in 2011 in the Journal of Biological Chemistry.

Given how little mRNA is present in polar bodies, the task was not easy, says Wessel, but through a combination of clever amplification and analysis techniques by lead author and graduate student Adrian Reich and second author Peter Klatsky, the team got it done.

“There’s no reason this should have worked, just because there was so little material,” Wessel says. “Single-cell sequencing is very challenging.”

The new technique could ultimately give parents and doctors a preview of which eggs are likely to make the most viable embryos. Finding which genes affect embryo viability is the next major step. With the new knowledge and techniques developed in this study, scientists could analyze the mRNA from polar bodies of eggs that are fertilized and track the progress of the resulting embryos.
Concussions and other head injuries have become a source of elevated concern in football and other sports in recent years, with various leagues revising policies to protect players better. But to make smart decisions about those policies, officials need to understand just what they are protecting players from.

Crisco worked with colleagues at Dartmouth and Virginia Tech. They fitted each school’s football helmets with tiny sensors that recorded 286,636 head blows among 314 players over three seasons. The data on the magnitude, frequency, and location of head blows amount to a measure of each player’s head impact exposure. Ultimately it can help doctors understand the biomechanics of how blows to the head result in injury.

Heavy Hitters

It’s early afternoon and the Brown football team is heading out to the practice field. In 2011, the Ivy League issued new guidelines that limit the number of full-contact practices, in part because of research led by J. J. Trey Crisco.

Concussions and other head injuries have become a source of elevated concern in football and other sports in recent years, with various leagues revising policies to protect players better. But to make smart decisions about those policies, officials need to understand just what they are protecting players from.

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Football players pay for touchdowns like this. Sensors in the Brown team’s helmets recorded hits to the head during three seasons.
“This allows us to quantify what the exposure is,” Crisco says. “It is the exposure that we need to build upon, so that we can then start understanding what the relationships are with acute and chronic head injury.”

The study, published in the Journal of Biomechanics, found that running backs and quarterbacks suffer the hardest hits to the head, while linemen and linebackers are hit on the head most often. By analyzing head impacts by position, Crisco says, researchers can help football league officials and equipment designers begin to think about ways to make players safer. That could possibly mean rule changes, or designing different helmets for different positions.

For the Love of the Game

Crisco devised the algorithm that allows the Head Impact Telemetry system to discern impact frequency, direction, and severity from tiny unidirectional sensors embedded in several positions inside the helmet. Simbex, a New Hampshire-based company, led by Rick Greenwald, PhD, developed...
the system, which fits inside a normal-looking football helmet that is available commercially. In fact, *Time* magazine called it one of the “Best Inventions of 2007.”

Using the helmet sensor, Crisco and his colleagues collected data that had led to an earlier paper, published in 2010, in the *Journal of Athletic Training*. During the 2007 season alone, the most frequently battered player sustained 1,444 jolts. On average, players sustained impacts 14.3 times per game and 6.3 times each practice. Their research is supported by the National Institutes of Health.

The total number of impacts is of interest to researchers because many suspect that even if no single blow results in a concussion, an accumulation of head trauma could still injure the brain in subtle ways.

Analyzing the location of the blows, the researchers found that offensive linemen are hit on the front of their helmets about half the time, suggesting that they can control where their impact will be. Quarterbacks, by contrast, experience blows from behind more than from any other direction. As any football fan has observed — and as Crisco’s study quantifies — when the quarterback is sacked, he is often blindsided and unprepared.

Whether the player is caught unaware or not, Crisco says, it is already clear that repeated, significant jolts to the head are a cause for concern.

A former college football and lacrosse player, Crisco is passionate about contact sports and believes they have many benefits. “Hitting is an essential component,” he says. “But intentional hitting with your head was never part of any sport and is poor technique.”
First Chairs

Crisco was installed as the inaugural Henry Frederick Lippitt Professor of Orthopaedic Research in 2011, in recognition of his teaching and research at Brown since 1996. He specializes in muscle injury, spine motion, and movement of the wrist—making Brown an international leader in hand kinematics. Crisco has also developed toys that take advantage of hand motion and build functional muscle strength in children with disabilities.

A second professorship in orthopaedics was dedicated at that time: the Lucy Lippitt Professorship in Orthopaedics, conferred upon Braden C. Fleming, PhD. Fleming is the leading PhD researcher and funded investigator in North America in the field of anterior cruciate ligament (ACL) injury and repair, a problem afflicting 400,000 people annually in the US.

On-the-Job Training

Dozens of Alpert Medical School students volunteer at Providence’s Rhode Island Free Clinic. The work gives them the chance to experience the health care system and its challenges, but they want to do more to help the uninsured.

In 2010, three Rhode Island Free Clinic (RIFC) student volunteer coordinators—Devin Smith MD’13, Pamela Escobar ’09 MD’13, and Ina Soh MD’13—found they were constantly fielding questions from fellow volunteers about how to get more involved in the delivery of patient care. Founded in 1999, RIFC provides free primary care, laboratory and diagnostics, specialty health and translation services, pharmacy, and wellness programs to uninsured and underinsured Rhode Islanders.

“Most of the medical students had been helping out with administrative tasks, such as scheduling, medical recording, and translating,” says Soh. What they really wanted was more hands-on experience.

The three coordinators and other students explored the idea of a student-run clinic. With the support of Medical School faculty and administrators and RIFC staff, and after researching other student-run clinics, the students prepared a proposal for the Brown Student Community Clinic (BSCC) and started planning the logistics.

The pilot clinic opened in the spring of 2011, and students are involved in every step of the patient visit. Of paramount importance to both RIFC and the Medical School was that the BSCC provide the same high level of care RIFC offers. Consequently, students are overseen by long-term, dedicated RIFC faculty-mentors.
JOAN M. TENO, MD, MS
Professor of Health Services, Policy and Practice and Associate Medical Director of Home and Hospice Care of Rhode Island
Care at the End of Life

Late in the day, Joan Teno makes one last round of Home and Hospice Care of Rhode Island to check on her patients. She is as comfortable here — overseeing patient care, talking with worried families — as she is in her sixth-floor office across town, in Brown’s Public Health building, where she studies policy and practice in end-of-life care.

Teno’s interest in end-of-life care began 30 years ago, when she was an intern. She has since become one of the nation’s foremost researchers on the topic, and last year published important new work on the experience of elderly dementia patients at the end of their lives.

Dementia has only recently gained recognition as being a terminal illness, Teno says, and the condition at this time is untreatable. The illness is unpredictable; eventually, most patients require long-term care in nursing homes or hospice. The high cost of care for dementia is a concern as policymakers scrutinize health care spending, especially with the coming “silver tsunami” of aging Americans. Identifying best practices and efficient uses of resources are important, if not urgent, public health concerns.

Teno advocates for patient-centered care. She believes that decision making should be based on the patient’s wishes and values, not on hospital culture or physician assumptions or cost-saving measures. Her research has found that in practice, quite the opposite is true.

In Search of the “Good Death”

Teno studies end-of-life care through several lenses. For example, she has spent the last eight years studying the use of feeding tubes in elderly dementia patients. She and her colleagues found wide variations among states and among different types of hospitals: large, for-profit hospitals known for aggressive care at the end of life use feeding tubes more, while rural hospitals not affiliated with medical schools use them less. This, despite the fact that medical evidence shows that feeding tubes do not improve survival or overall outcomes in patients with dementia.

In 2011, Teno and her colleagues published a new study in the Journal of the American Geriatrics Society that found that discussions with family members about the decision to place feeding tubes surgically are often inadequate. Of the nearly 500 surviving family members surveyed, 13.7 percent stated that medical providers inserted the tube without discussing it first; 39.3 percent said the
physician did not discuss the risks of feeding tubes.

“Our results suggest that in these states with a high rate of feeding tube insertion we need to improve decision making so that the decision to insert a feeding tube is based on a process that elicits and respects patients’ wishes,” says Teno, the paper’s lead author.

Pros and Cons

With colleagues from the Public Health Program’s Center for Gerontology and Healthcare Research, Teno published another study in 2011 that examined the utilization of hospice services by patients with dementia. The study, also published in the Journal of the American Geriatrics Society, found that “[p]eople whose loved ones received hospice care reported an improved quality of care, and had a perception that the quality of dying was improved as well,” says Teno.

In contrast, Teno and her co-researchers have charted a disturbing trend that negatively affects patients with dementia during the last three months of their lives: burdensome transitions between health care settings, such as moves from the nursing home to the hospital. These transitions can result in medical errors, lack of care coordination,
and for persons with advanced dementia, emotional distress and agitation. The study, published in the *New England Journal of Medicine*, found that although such transitions are not consistent with goals of providing dying patients with comfort, a fifth of them experience at least one during their last three months.

Brown University provides this and other data related to nursing home care in the US at the website http://ltcfocus.org. The goal, according to its homepage, “is to allow researchers to trace relationships between state policies, local market forces, and the quality of long-term care and enable policymakers to craft state and local guidelines that promote high-quality, cost-effective, equitable care for older Americans.”

Teno is part of a group of researchers in the Public Health Program devoted to understanding how to measure and improve the health care experiences of frail, older, and dying persons. Their work is setting clear, research-based guidelines for practitioners and policymakers.

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**Lose Weight, Control Diabetes**

Diabetes is taking a staggering social and economic toll on this country: 26 million Americans have it, 79 million more are likely to get it, and annual related health care costs have reached $174 billion.

Rena Wing, a national authority on weight loss maintenance, brings her expertise to bear on this epidemic every day. As professor of psychiatry and human behavior at Alpert Medical School and director of The Miriam Hospital’s Weight Control and Diabetes Research Center, Wing conducts NIH-funded studies that reveal not only the best ways to lose weight, but also how to keep weight off. And in the vast fight against diabetes, effective, low-cost, accessible methods are critical.

Wing played a lead role in the three-year Diabetes Prevention Program (DPP), which found that people with pre-diabetes who changed their lifestyle and diet significantly reduced their risk for developing diabetes—even more than those who took medication. In September 2011, Wing, shown above on Capitol Hill, bore witness to the efficacy of research in fighting diabetes. She was joined by National Institute of Diabetes and Digestive and Kidney Disease Director Griffin Rodgers, an alumnus of Brown’s Medical School, who noted that his institute is disseminating the DPP exercise and weight loss intervention across the country.

Also in 2011, Wing and colleagues published a paper about their “Fit for Delivery” study, a simple behavioral intervention that provided pregnant women with advice and feedback about weight control. The program helped normal-weight and obese and overweight women return to pre-pregnancy weight after delivery.
Approaches to Global Health

At 7 p.m. Providence time, it’s just after 1 a.m. the next day in Rwanda, where Drs. Brian Montague, Michael Koster, Adam Levine, and Fadya El Rayess are representing Brown in the Rwanda-US Academic Consortium. The consortium seeks to increase medical education opportunities and expand the country’s health care workforce. The Global Health Initiative was instrumental in making Brown part of this innovative partnership.

Dr. Susan Cu-Uvin is director of the Global Health Initiative (GHI), a multidisciplinary, university-wide organization that coordinates international education, research, service, and development of partnerships. Begun in 2009, the GHI has strengthened Brown’s global health enterprise by working with programs and faculty in 33 countries, capitalizing on Brown’s expertise in the social, political, and economic dimensions of health, and promoting research, education, and outreach around the world.

One of the newest partnerships is with the Clinton Health Access Initiative and the Ministry of Health in Rwanda. Supported by the US government and the Global Health Fund, the program places Brown faculty for periods of one year or more as clinical educators within the Rwandan teaching hospitals. Faculty are placed in departments of medicine, pediatrics, and family medicine, with emergency medicine to be added in the second year.

The Long Haul

Aid groups flocked to Haiti after the January 2010 earthquake that devastated the already troubled nation. While medical relief was necessary, what administrators at Port-au-Prince’s St. Damien Hospital really wanted from NGOs was long-term commitment and a willingness to listen to what Haiti’s needs are.
TIMOTHY P. FLANIGAN, MD
Dean’s Professor of Medical Science in Honor of Charles Carpenter, Professor of Medicine and of Health Services, Policy and Practice, and Director of the Division of Infectious Diseases

BRIAN MONTAGUE, DO, MS, MPH
Assistant Professor of Medicine

MICHAEL KOSTER, MD
Assistant Professor of Pediatrics (Clinical)

SUSAN CU-UVIN, MD
Professor of Obstetrics and Gynecology and of Medicine, and Director of the Global Health Initiative

FADYA EL RAYESS, MD
Clinical Assistant Professor of Family Medicine
Enter Brown physicians Sybil Cineas, Michael Koster, Susan Cu-Uvin, and Tim Flanigan. They offered to work side-by-side with doctors at the pediatric hospital and at the Université Notre Dame d’Haïti to augment medical education efforts over the long term.

In October 2010, Dean of Medicine and Biological Sciences Edward J. Wing traveled to Haiti to sign a memorandum of understanding with Notre Dame. The following March, the first faculty representatives began a month-long teaching and rotation schedule at the hospital.

Through an exchange program, students from Notre Dame are given the opportunity to participate in seminars and short training sessions at Brown. Notre Dame student Nelly Drouinaud was the first to come to Providence, in August 2011.

GHI partners with faculty in various disciplines across campus. At the Population Studies and Training Center, Brown works with the University of Colorado, Boulder and two African institutions — University of Witwatersrand, in South Africa, and the African Population and Health Research Center, in Kenya. The goal is to promote the study of African human population statistics and the enhancement of population infrastructure in Africa, through exchange among scholars and staff at participating institutions.

Another collaboration unites engineering, medicine, and biostatistics in developing a point-of-care device to detect HIV mutations at the gene level. Developed by Brown Professor of Engineering Anubhav Tripathi, the disposable microfluidic detection device is intended for locations without access to central laboratory facilities and will be tested in partner sites in India, Thailand, and Kenya.
The Path to Health

Part of the Global Health Initiative’s mission is to support Brown faculty and students who wish to pursue global health projects. GHI gave four Faculty Curriculum Development Awards in 2010-2011 for projects such as Global Health at Home and Abroad, to Gowri Anandarajah, MD, and Fadya El Rayess, MD, in the Department of Family Medicine. Ten Framework Global Health Scholarships were awarded to students. One example is master of public health candidate Marita Mann’s project, Post Crisis Treatment Failure and Drug Resistance to HIV Antiretrovirals in Western Kenya.

Meanwhile ... In Ghana, West Africa

Back from the Brink

HIV/AIDS has been called the single greatest reversal in human development in modern times. In sub-Saharan Africa, the disease tears apart families, thwarts economic development, and destabilizes governments.

A new partnership with the University of Ghana aims to turn the tide by strengthening higher education in the West African nation. Infectious disease specialists Tim Flanigan and Awewura Kwara and other faculty members from Alpert Medical School are working with peers at Tufts University and Yale to enhance pre-clinical education, develop excellence in HIV/AIDS education research through faculty development, enhance training among professionals throughout the country, and establish a National Center of Excellence for HIV/AIDS at the University of Ghana. The partnership is funded by a $1.1 million grant from the United States Agency for International Development.

Flanigan says, “Ghana is a leading country in West Africa with an emerging economy and relatively new but stable democracy ... Strengthening the curriculum, educational resources, and faculty development in the theme of HIV and AIDS has the potential to strengthen the university overall and aid in addressing development challenges such as HIV/AIDS throughout Ghana and the subregion.”
In 2006, Alpert Medical School recruited Zink from the University of Michigan to be the inaugural chair of its new Department of Emergency Medicine. This was just the second emergency medicine department in the Ivy League, and its establishment was a watershed moment for the field. “This was a place where a new chair with a new department could have an impact,” says Zink.

A committed clinician who takes weekend and overnight shifts despite his academic and administrative load, Zink was also drawn to Brown’s clinical setting: with more than 150,000 emergency patient visits a year, Rhode Island Hospital’s is one of the 10 busiest EDs in the country. “Emergency medicine is a key part of what makes the hospitals go here,” he says.

Shortly after arriving, Zink and other Alpert Medical School leaders articulated a vision for the Department: “Build our academics.” And so, during the past five years, the Department has recruited 35 highly academic faculty, established new Emergency Medicine divisions—including International Emergency Medicine, Sports Medicine, EMS and Disaster Medicine, and Women’s Health in Emergency Care—and advanced clinical care at Brown’s affiliated hospitals. For example, Zink and colleagues created a nationally accredited chest pain center at Rhode Island Hospital. The Department has also become more involved with the Medical School, particularly in research and in the centerpiece course, Doctoring. Additionally, Zink now serves as assistant dean for medical student career development.

An Urgent Matter

It’s late, but there is still a steady stream of patients through the doors of Rhode Island Hospital’s Emergency Department. Inside, Brian Zink sees his 10th case of the night. It’ll be a long one: Zink is here until dawn.
To advance the Department, Zink has supported innovative programs that “other chairs might have questioned, in terms of both cost and value,” says Assistant Professor of Emergency Medicine Megan L. Ranney. One such project was a grant writing workshop that she helped develop. Although the idea was untried and untested, the program not only increased the Department’s grant submission rate, but it received a national award for innovation in emergency medicine education, as well. This tale of success is part of a larger narrative: the Department doubled its research funding three years after Zink’s arrival—two fewer than he had initially planned. It is now one of the nation’s leading emergency medicine departments in research.

In September 2011, Zink was named the inaugural Frances Weeden Gibson-Edward A. Iannuccilli, MD, Professor of Emergency Medicine. The Department he has done so much to build is now ready to face the challenges that, especially in clinical emergency medicine, continue to mount.

“Above all, Dr. Zink has a vision,” says Associate Residency Program Director and Assistant Professor of Emergency Medicine Jessica L. Smith.
Get Some Sleep

Teenage study participants are snoozing soundly in their beds, where EEG electrodes will record their brain oscillations all night.

This kind of research provides insights into the sleep patterns of young people—the area in which Mary A. Carskadon is a widely recognized expert. More than 250 studies by the scientist, a recipient of the National Sleep Foundation’s Lifetime Achievement Award, have brought to the national stage the consequences of insufficient sleep in adolescents and concerns over early school start times.

Carskadon’s 2011 paper in the *Journal of Neuroscience* examined brainwave patterns in the notoriously turbulent brains of teens. Her findings showed that most individuals maintain a unique and consistent pattern of underlying brain oscillations during sleep over the course of years. The work lends a new level of support to the idea that people produce a kind of brainwave “fingerprint.”

“At the moment it’s too soon to tell anything about individual sleep or behavior from this, but it could provide a tool to geneticists,” Carskadon says. “It is a link between behavior and genes.” The research “may open up future possibilities in using this kind of analysis to look for [brain patterns] that could be predictive of someone, say, who might go on to develop schizophrenia or depression.”
The Division of Biology and Medicine had strong financial results in fiscal year 2011, primarily due to increased sponsored funding to support faculty research. Total sponsored support (direct and indirect costs) grew to a record $88 million as spending on American Recovery and Reinvestment Act stimulus grants continued and grant activity from both new and current faculty accelerated. The resulting operating surplus of $6.4 million was used to pay down internal debt and fund our ongoing capital expenditure plan. As a result, the Division is now debt free, and fortunate to be in a strong financial position to face challenges brought on by an increase in operating costs and reductions in National Institutes of Health-sponsored funding.

### FY11 REVENUES (Campus)

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### FY11 EXPENSES (Campus)

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**FY11 STATEMENT OF RESERVES**

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<td>5.4% Total Restricted Funds</td>
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**FY11 SPONSORED FUNDING** (Campus and Affiliated Hospitals)

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**RESEARCH SPACE** (Campus and Affiliated Hospitals)

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<td>Providence VA Medical Center</td>
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Fiscal year 2011 was a success for the Office of Biomedical Advancement. Benefactors supported the mission of the Division of Biology and Medicine with $13,024,394 in new gifts and pledges. A record 32 leadership gifts of $100,000 or more were pledged—a considerable increase over the 18 leadership gifts in fiscal year 2010.

Even with this focus on major giving, the Brown Medical Annual Fund reached an all-time high of $946,807, a 17-percent increase over the previous year. These strong results were driven, for the most part, by the focus on engaging alumni, parents, faculty, and friends of Brown in support of the Medical School’s new home. The Advancement Office looks forward to focusing on new philanthropic priority areas in the coming year based on Dean Wing’s strategic goals.

**INDIVIDUALS**

Represents all gifts paid in fiscal year 2011.

**$2 million and above**
The late Sidney E. Frank ’42 LHD’05

**$1 million to $1,999,999**
The late Warren Alpert and The Warren Alpert Foundation
The late Frances Weeden Gibson ’45, P’58

**$500,000 to $999,999**
Alice M. Tisch and Thomas J. Tisch ’76

**$100,000 to $499,999**
Anonymous
Jill E. Braufman ’83 and Daniel L. Nir P’14
Preston C. Calvert ’76 MD’79 and
Margaret Guerin-Calvert ’76
Mary Ann Ehlich and Stephen R. Ehlich ’55, P’85
The late Lucille Boutilier Hacking ’43
Elizabeth Wood Karlson ’84 and
Steven E. Karlson ’82
The late Devra Abramson Poll ’42
Steven Price ’84
Diane N. Weiss
Jean H. Witmer and Richard H. Witmer Jr. ’74, P’12, ’14

**$50,000 to $99,999**
Marilyn Rice Bray ’53 and George A. Bray Jr. ’53
Mary Panton and
John Panton P’79MD’82, ‘83MMS’86MD’86, GP’15
Marilyn Dawson Sarles MD’76 and
H. Jay Sarles PAM’07
Jerome B. Zeldis ’72 ScM’72, P’04

**$25,000 to $49,999**
Anonymous
Susan Bazar and David Bazar
Dorothy Beckwith and G. Nicholas Beckwith III ’67, P’79
Flora A. Coletta
Mitchell H. Driesman ’79 MD’77 and
Shelley K. Driesman MD’80, P’07, ’12MD’16
The late Gertrude and the late Seebert Goldowsky ’28
Alexes Hazen ’87 MD’96
Chastity Lam and Kin Lam P’14MD’18, ’15MD’19
Jamie S. Manville and Brock Manville
Srihari S. Naidu ’93 MD’97
Peter J. Panton ’79 MD’82 and Estelle Patsavos Panton P’15
Manuel S. Rose MD’86
Andrew Sigal and Shelley Sigal
Steven Sigal and Judy Sigal
Rena Wing, PhD and Edward J. Wing, MD
Sarah Lloyd Wolf ’72 and Charles B. Wolf ’72

**$15,000 to $24,999**
Preetha Basaviah ’91 MD’95 and Venky Ganesan
Mark S. Blumenkranz ’72 MD’75 MMS’76 and
Recia Kott Blumenkranz, MD ’76, P’05, ’08
Daniel A. DiPrete ’85 MD’89 and
Carrie E. DiPrete P’15 MD’19, ’15 MD’19
Steven G. Dorsky MD’80 and Frances G. Dorsky P’03, ’05, ’09
Sivan Hines ’84 MD’87 and Jeffrey F. Hines ’83 MD’86
Robin Chemers Neustein ’75 and the Lightfighter Trust
Richard K. Weil Jr. ’59
Peter P. Yu ’77 MD’80

**$10,000 to $14,999**
James L. Abernathy ’63, P’04
Ellen Fuchs Abramson ’87 and David A. Abramson ’84 P’95
Kathleen Lee Audin ’86
University Orthopedics, Inc.

The new home of Alpert Medical School became a reality because of philanthropic support from alumni, parents, faculty, and friends of the Medical School.

With a $1 million gift to support Alpert Medical School and its new home, University Orthopedics, Inc., the largest clinical orthopaedic practice in Rhode Island, and the Rhode Island Hospital Orthopedic Foundation, deepened their commitment to medical research and education, and to improving patients’ lives.

The orthopaedists chose to name a case study room in the new building in honor of Dr. Michael G. Ehrlich, the Vincent Zecchino Professor and Chair of the Department of Orthopaedics at Alpert Medical School and surgeon-in-chief of orthopaedics at Rhode Island Hospital and The Miriam Hospital. “Dr. Ehrlich has been our leader for over 20 years,” says Dr. Edward Akelman, vice chair of Orthopaedics at Alpert Medical School and surgeon-in-charge of the Division of Hand, Upper Extremity and Microvascular Surgery. “It is exceedingly rare to meet a physician who, like Dr. Ehrlich, is extraordinarily talented as a researcher, an educator, and a clinician.”

The case study room has tiered seating and provides an ideal environment for promoting interactive discussions. Multi-purpose and flexible, the room can be used for anything from demonstrations of physical exam techniques to meetings for large student groups.

To see a video about Dr. Ehrlich’s achievements, go to http://brown.edu/go/Ehrlich.

$5,000 to $9,999
Anonymous
Penny E. Bank P’01
Ellen Melnick Brown ’80 MD’83 and
Marc H. Brown ’80 ScM’82 PhD’87, P’12
Frederick W. Burgess PhD’83 MD’86
Patricia Arnold Buss ’78 MD’81
Julia P. Califano and Nicholas A. Califano ’64, PMD’08
Elizabeth Zoph Chace ’59 and the late Malcolm G. Chace
Richard G. Ellenbogen ’80 MD’83 and
Sandra E. Ellenbogen P’11
Nicole H. Gill ’90 and John A. Deckoff
Vivien Hassenfeld and Alan Hassenfeld and
the Hassenfeld Foundation
Edward J. Hayes MD’94
Carol Meehan Hunt P’74, ’75, GP’00, ’03, ’03, ’04, ’07
Herbert M. Kaplan
Esta Kawaoka and Eric Kawaoka, MD P’00MD’04
William A. Kaye ’73 MD’76
Richard J. Larschan
Sandra Nusinoff Lehrman ’69 MD’76 and
Stephen A. Lehrman ’73
Salvatore J. Loporchio, MPH, JD MD’85
Mary E. Mainelli and Hugo R. Mainelli Jr. ’58 P’86
Garey H. Noritz ’95 MD’99
Calvin E. Oyer, MD
Andrew L. Salner ’73 MD’76
E. A. Sutcliffe MD’79 and Candace L. Sutcliffe P’10
Caroline Yee and Ting Yee P’14MD’18

$2,500 to $4,999
Anonymous
Anne M. Bercovitch, MD ’69 MMS’71 and
Lionel G. Bercovitch, MD P’00MD’04,’02,’08
Kenneth W. Burchard ’69 MMS’71 RES’80
Dennis A. Chuck ’76 MD’79, P’00
Silvia Corvera, MD and Michael P. Czech ’67 PhD’72, P’99
Roberta H. de Regt ’76 MD’79 and Mark A. de Regt ’74
David Jonathan Fuerst ’75 MD’78 and Marie M. Fuerst P’08
Jeffrey P. Green ’88 MD’91
Richard A. Johnson ’72
Janice A. Kechijian and
Paul Kechijian, MD AB’61 ScM’64 P’02,’06
Marie J. Langlois ’64
Brian H. Margolis ’78 MD’81
Daniel M. Medeiros MD’86
Mark Napoli RES’04
James H. Revkin MD’81
W. Steves Ring, MD ’67 MMS’69
Michael S. Roh ’91 MD’95 and Myong Yi Roh
Lisa A. Taitsman ’90 MD’94
Christopher G. Thanos ’97 PhD’02
Roger J. Waltzman ’88 MD’92
Harry A. Ward MD’81

American College of Radiology
American Federation for Aging Research
American Foundation for Suicide Prevention
American Heart Association
American Parkinson Disease Association
American Society of Nephrology
The Angelman Syndrome Foundation
Anonymous
Aprecia Pharmaceuticals Company
Bank of America Charitable Foundation
C.R. Bard Foundation, Inc.
Arnold and Mabel Beckman Foundation
Leo H. Bendit Charitable Foundation
Bio-Tree Systems, Inc.
Blue Cross & Blue Shield of Rhode Island
Everett F. Boyden Trust
The Brain & Behavior Research Foundation
Lyman B. Brainerd Jr. Family Foundation
Burroughs Wellcome Fund
California Healthcare Foundation
Cedars of Lebanon Foundation, Inc.
The Champlin Foundations
The Children’s Mercy Hospital
Citizens Charitable Foundation
Clai Jin Company
The Community Foundation for the National Capital Region
The Commonwealth Fund
Conservation International
Corp Brothers, Inc.
CVS Caremark Corporation
DEARS Foundation, Inc.
Dimeo Construction Company
The Ellison Medical Foundation
Epilepsy Foundation
The Norman and Rosalie Fain Family Foundation
Flight Attendant Medical Research Institute
Ira and Anna Galkin Charitable Trust
GE Foundation
Gilbane Building Company
Glenn Foundation for Medical Research
The Arnold P. Gold Foundation
Grimshaw-Gudewicz Charitable Foundation
The John A. Hartford Foundation, Inc.
HealthCor Management, LP
Howard Hughes Medical Institute
Human Frontier Science Program Organization
The Jaffe Foundation

JULY 1, 2010–DECEMBER 30, 2011
CORPORATIONS AND FOUNDATIONS
Represents all gifts and grants of $1,000 and up.

ABMRF/The Foundation for Alcohol Research
Advanced Oncology PC
Alexander’s Uniforms
Alzheimer’s Association
American Association for the Advancement of Science
American Association of Physical Anthropologists
American Cancer Society
American Chemistry Council

PHILANTHROPY
EXECUTIVE LEADERSHIP

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Dean of Medicine and Biological Sciences

Michele G. Cyr, MD  
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Senior Associate Dean for Biomedical Advancement

Glenn A. Tung, MD  
Associate Dean for Clinical Affairs

Terrie Fox Wetle, PhD  
Associate Dean of Medicine for Public Health and Public Policy

DEPARTMENT CHAIRS

Biology

Mark D. Bertness, PhD  
Ecology and Evolutionary Biology

Wayne D. Bowen, PhD  
Molecular Pharmacology, Physiology and Biotechnology

Laurent Brossay, PhD, MS  
Molecular Microbiology and Immunology

Barry W. Connors, PhD  
Neuroscience

Agnes B. Kane, MD, PhD  
Pathology and Laboratory Medicine

Kimberly L. Mowry, PhD  
Molecular Biology, Cell Biology and Biochemistry

Clinical

Jeffrey M. Borkan, MD, PhD  
Family Medicine

William G. Cioffi Jr., MD  
Surgery

Garth Rees Cosgrove, MD  
Neurology
ENDOWED PROFESSORSHIPS

The following is a list of endowed professorships and the Division faculty who hold them.

- **L. Herbert Ballou University Professorship**
  Barry W. Connors, PhD

- **J. Murray Beardsley Professorship in Surgery**
  William G. Cioffi, MD

- **Esther Elizabeth Brintzenhoff Professorship in Medical Sciences**
  Christine A. Biron, PhD

- **Robert P. Brown Professorship in Biology**
  Mark D. Bertness, PhD

- **Hermon C. Bumpus Professorship in Biology**
  John M. Sedivy, MD

- **Paul Calabresi, MD, Professorship in Oncology**
  Peter J. Quesenberry, MD

- **Chace-Joukowsky Professorship in Obstetrics and Gynecology**
  (Search in progress)

- **Frank L. Day Professorship in Biology**
  Edward J. Wing, MD

- **George D. Eggleston Professorship in Biochemistry**
  Susan A. Gerbi, PhD

- **Sidney A. Fox and Dorothea Doctors Fox Professorship in Ophthalmology and Visual Sciences**
  David M. Berson, PhD

- **Sidney A. Fox and Dorothea Doctors Fox Professorship in Ophthalmology and Visual Sciences**
  (Search in progress)

- **Sidney A. Fox and Dorothea Doctors Fox Professorship in Ophthalmology and Visual Sciences**
  Michael Paradiso, PhD

- **Michael G. Ehrlich, MD, Professorship in Orthopaedic Research**
  Qian Chen, PhD

- **Frances Weeden Gibson – Edward A. Iannuccilli, MD, Professorship in Emergency Medicine**
  Brian J. Zink, MD

- **David S. Greer, MD, Professorship in Geriatric Medicine**
  Richard W. Besdine, MD

- **Alan G. Hassenfeld Professorship in Pediatrics**
  Cindy L. Schwartz, MD

- **Sylvia Kay Hassenfeld Professorship in Pediatrics**
  Robert B. Klein, MD

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**John J. Cronan, MD**
*Diagnostic Imaging*

**Michael G. Ehrlich, MD**
*Orthopaedics*

**James M. Gilchrist, MD**
*Neurology (Interim)*

**Agnes B. Kane, MD, PhD**
*Pathology and Laboratory Medicine*

**Robert B. Klein, MD**
*Pediatrics*

**Charles J. McDonald, MD, MS**
*Dermatology*

**Maureen G. Phipps, MD, MPH**
*Obstetrics and Gynecology (Interim)*

**Steven A. Rasmussen, MD, MMS**
*Psychiatry and Human Behavior (Interim)*

**Louis B. Rice, MD**
*Medicine*

**David E. Wazer, MD**
*Radiation Oncology*

**Brian J. Zink, MD**
*Emergency Medicine*

**Public Health**

**Stephen L. Buka, ScD**
*Epidemiology*

**Constantine A. Gatsonis, PhD**
*Biostatistics*

**Christopher W. Kahler, PhD**
*Behavioral and Social Sciences*

**Ira B. Wilson, MD, MSc**
*Health Services, Policy, and Practice*
Dean’s Professorship in Medical Sciences
Timothy P. Flanigan, MD

Henry Ledyard Goddard University Professorship in Biostatistics
Constantine A. Gatsonis, PhD

Florence Pirce Grant University Professorship in Community Health
Vincent Mor, PhD

Jeffrey and Kimberly Greenberg-Artemis and Martha Joukowsky Professorship in Gastroenterology
Jack R. Wands, MD

Intrepid Heroes Professorship in Orthopaedic Surgery
Christopher T. Born, MD

Joukowsky Family Professorship in Medicine
Louis B. Rice, MD

Karl E. Karlson, MD, and Gloria A. Karlson Professorship in Cardiothoracic Surgery
Frank W. Sellke, MD

Krishnamurthi Family Professorship in Urology
Mark Sigman, MD

Ruth and Paul Levinger Professorship in Cardiology
(SEARCH IN PROGRESS)

Nancy Duke Lewis Professorship in Biology and Gender Studies
Anne Fausto-Sterling, PhD

Lucy Lippitt Professorship in Orthopaedics
Braden Fleming, PhD

Henry Frederick Lippitt Professorship in Orthopaedic Research
Joseph J. Crisco III, PhD

Manning Assistant Professorship in Molecular Biology, Cell Biology, and Biochemistry
Mark Zervas, PhD

Manning Assistant Professorship in Ecology and Evolutionary Biology
Casey Dunn, PhD

Donald G. Millar Distinguished Professorship in Alcohol and Addiction Studies
Peter M. Monti, PhD

Mittleman Family Director of the Center for the Study of Human Development
Stephen L. Buka, ScD

The Robin Chemers Neustein Professorship in Biomedicine
Kimberly L. Mowry, PhD

William and Mary Oh – William and Elsa Zopfi Professorship in Pediatrics for Perinatal Research
James F. Padbury, MD

Stephen T. Olney Professorship in Natural History
Johanna H. Schmitt, PhD

Phyllis and Charles M. Rosenthal Director of the Brown-Marine Biology Laboratory Partnership
Christopher Neill, PhD

Royce Family Professorship in Teaching Excellence and Professor of Pathology and Medicine
Lundy Braun, PhD

Sigal Family Professorship in Humanistic Medicine
Fred Schifman, MD

Charles A. and Helen B. Stuart Professorship in Medical Science
(SEARCH IN PROGRESS)

University Professorship
Arthur Landy, PhD

Upjohn Professorship in Pharmacology
Wayne D. Bowen, PhD

Alva O. Way University Professorship
Edward Hawrot, PhD

Henry Merritt Wriston Professorship
John Donoghue, PhD

Vincent Zecchino, MD, Professorship in Orthopaedic Surgery
Michael G. Ehrlich, MD

Mary E. Zucker Professorship in Psychiatry and Human Behavior
(SEARCH IN PROGRESS)
BIOMED AT A GLANCE

DIVISION OF BIOLOGY AND MEDICINE FACULTY

Total Faculty: 2,243
- Biology: 125
- Public Health
  - Campus-based: 82
  - Clinical: 22
- Medical School
  - Academic: 706
  - Clinical: 1,363

Academic Departments: 23
- Clinical: 13
- Basic Science: 5
- Public Health: 4
- Hybrid (basic science-clinical): 1

PROGRAM IN BIOLOGY

280 undergraduate degrees awarded in 2011, of which 38% with honors

59 graduate degrees awarded in 2011

7 graduate programs:
- Biomedical Engineering
- Biology and Computational Biology
- Ecology and Evolutionary Biology
- Molecular Biology, Cell Biology, and Biochemistry
- Molecular Pharmacology and Physiology
- Neuroscience
- Pathobiology

78 postdoctoral research associates and fellows

252 graduate students

$1.38 million in external funding for graduate students from Fulbright, Fogarty, NIH National Research Service Awards, and other sources.

234 research awards totalling $45 million in FY11
ALPERT MEDICAL SCHOOL

420 medical students

92 undergraduate institutions, 89 states, and 7 countries represented

Class of 2011: a snapshot

• 100 graduates
• 54% women, 46% men
• 15 underrepresented minorities
• 4 Rhode Island natives
• 14 entered residency programs in Rhode Island

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, including a children’s hospital, adult and pediatric psychiatric hospitals, and a Level I trauma center. Together the hospitals serve 1.5 million people of diverse backgrounds.

PUBLIC HEALTH PROGRAM

222 students

• 80 undergraduate concentrators
• 99 master’s students
• 43 doctoral candidates

4 departments:

• Epidemiology
• Behavioral and Social Sciences
• Health Services, Policy and Practice
• Biostatistics

Over 1,000 peer-reviewed publications, chapters, and books

$40 million in external funding to the Program’s campus-based research centers in FY11

11 centers and institutes conducting research in the areas of evidence-based medicine, addiction, HIV/AIDS, global health, epidemiology, gerontology, healthy behaviors, and more.