

2011-2012

# Inside SARGENT

Boston University College of Health & Rehabilitation Sciences: Sargent College

CAN HE READ

YOUR MIND?

Neuroscientist Frank Guenther's telepathic technology can capture a thought and transmit it to a computer screen. Now he's working with speech-language pathologists to put it to use. Page 10

TREATING DISEASE-RELATED MUSCLE LOSS, P 2  
RECOVERING FROM KNEE SURGERY, P 6  
SPORTS MEDICINE FOR THE UNDERSERVED, P 14



**Dear Friends,**

Faculty and students at Sargent College are tackling a wide range of issues, from faltering muscles to chronic homelessness. However, one thing unites their work—a desire to make a difference in the world by preventing disease and improving the lives of those with disabilities. Whether their research is carried out in the laboratory or in the community, Sargent College faculty aim to translate their

findings into meaningful clinical treatments and contribute to the growing body of evidence-based approaches to rehabilitation.

In this issue of *Inside Sargent*, we celebrate that commitment. You will read about Professor Susan Kandarian's exhaustive search for the genes involved in muscle wasting caused both by disease and disuse; her advances could help patients with cancer—and astronauts. Professor Frank Guenther is already taking his lab results into the clinic. His computer model of speech production has improved our understanding of a wide range of communication disorders and is now being used to develop brain computer interfaces that allow patients whose speech planning is massively impaired to produce spoken output.

Much of our research takes place outside the walls of Sargent College. If your summer 2011 vacation brought you to Boston, you might have been a part of Assistant Professor Simone Gill's gait study. She spent her break at the Museum of Science, Boston, in an effort to investigate walking patterns and educate the public through participation in research.

Gill isn't alone in looking for innovative ways to expand her own knowledge while helping others. Assistant Professor Christine Helfrich has devoted much of her career to developing and evaluating interventions to help people who are homeless build the skills needed to live on their own. Marianne Farkas, director of training at the Center for Psychiatric Rehabilitation, has been adapting treatment breakthroughs made in the U.S. to other cultures and countries. Alumna Alison Books ('04, '05) and Clinical Assistant Professor Roberta Durschlag have joined with Family Table, a Boston food pantry, to give the families it serves more healthy options. Our faculty's work in the area of arthritis, which is supported by our new National Institute on Disability and Rehabilitation Research-funded center, aims to help those with the disease exercise more effectively and return to employment. Finally, you will see how our students, such as recent undergraduate Stephanie Joe ('11), master's student Shari Davis ('10, '12), and doctoral candidate Will Evans ('10, '13) are as dedicated as our faculty to giving back to the communities they serve.

I feel privileged to work with such a talented and devoted group of faculty and students and am pleased to share some of their successes with you. I hope you find everything happening at Sargent College as interesting and inspirational as I do.

With warm regards,

*Gloria Waters*

Gloria Waters  
Dean and Professor

"MUCH OF OUR RESEARCH TAKES PLACE OUTSIDE THE WALLS OF SARGENT COLLEGE. IF YOUR SUMMER 2011 VACATION BROUGHT YOU TO BOSTON, YOU MIGHT HAVE BEEN A PART OF ASSISTANT PROFESSOR SIMONE GILL'S GAIT STUDY."

**InsideSARGENT**

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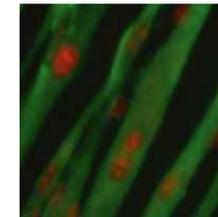
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**DISCOVERY**



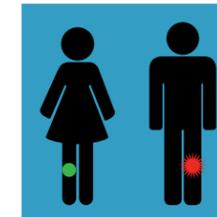
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# Reversing Muscle Loss in Cancer Patients— and Astronauts

AN AMBITIOUS STUDY OF THE GENES THAT CAUSE MUSCLE ATROPHY COULD LEAD TO NEW CLINICAL OPTIONS IN CANCER CENTERS—AND IN SPACE.

By Bari Walsh

**One of cancer's most devastating calling cards** is cachexia, a wasting condition that causes muscle atrophy and severe weight loss, reducing those afflicted to immobility and a hauntingly shrunken condition.

Seen also in patients with AIDS, chronic lung disease, congestive heart failure, and other maladies, cachexia is not just about losing weight or losing mass, says Susan Kandarian, a professor of health sciences at Sargent College. "It contributes directly to morbidity and mortality," she says. "It negatively affects a patient's ability to fight infection, endure surgery, and withstand chemotherapy and radiation. If a person has cachexia, the chances that he or she will die of the underlying disease are greatly increased.

"The medical community is becoming more aware that muscle loss is a harmful component of so many diseases," Kandarian says. "Doctors know that patients would do better and would respond better to treatment if muscle loss could be prevented. The problem is, we really have nothing to offer people."

Doctors can try to stem the tide with nutritional support, but according to Associate Professor of Medicine Caroline M. Apovian, director of the Nutrition & Weight Management Center at the BU-affiliated Boston Medical Center, that just tackles one part of the problem: "It can only prevent more muscle mass loss; it can't put back what the patient has already lost. The metabolic processes that go on with cancer are

geared toward killing the host, so once those processes are in place, it's very difficult to reverse them.

"It would be nice just to make sure that when you're losing weight, you're only losing fat, but that's not the case, you always lose protein as well."

That's something Kandarian is working to change. For more than 20 years, her lab has played a leading role in understanding the way muscles work—and what happens when they stop working. Her groundbreaking research on atrophy—first on disuse atrophy, the kind that afflicts astronauts, and then on disease-related atrophy like cancer cachexia—has uncovered the genetic pathways that regulate the phenomenon. Once those pathways are better understood, drug manufacturers will have promising new targets for genetic therapies that could reverse or prevent atrophy and dramatically improve outcomes for people with serious illnesses.

Skeletal muscle, such as biceps and deltoids, makes up around half of our body weight, and muscle cells are unique, Kandarian says; they rarely undergo turnover, so they're mostly with us from birth to death. Atrophy results from a loss of protein—specifically, from an imbalance between protein synthesis and protein degradation. Muscle fibers that lose protein get smaller and lose their ability to produce force.

When Kandarian began to explore the process by which this occurs, in work funded by the National Institutes of

"WE'RE DOING EVERYTHING WE CAN TO UNDERSTAND MUSCLE WASTING AND TO FIND WAYS TO STOP IT WITH EVERY POSSIBLE TACTIC WE CAN IMAGINE."

ROBERT JACKMAN



Photo by Kalman Zabarsky

"THE MEDICAL COMMUNITY IS BECOMING MORE AWARE THAT MUSCLE LOSS IS A HARMFUL COMPONENT OF SO MANY DISEASES. DOCTORS KNOW THAT PATIENTS WOULD DO BETTER AND WOULD RESPOND BETTER TO TREATMENT IF MUSCLE LOSS COULD BE PREVENTED."

SUSAN KANDARIAN

Health and, for a time, by NASA, among other grantors, she focused on the basic science governing the calcium activating system in muscles. She reported key findings about the critical role calcium plays in muscle contraction, and about how that role changes in disuse.

She later undertook an ambitious survey—called a gene expression analysis—comparing all the expressed genes in fibers from animals that had no atrophy to all the expressed genes in fibers with atrophy. She investigated 8,000 genes in all and, using microarray technology, plotted their expression over a 14-day time window. She determined which genes were early responders to disuse, which responded most dramatically, and which responded only later in the cycle.

Researchers in her lab, including Robert Jackman, a research associate professor who specializes in molecular biology, began looking for genes that control the proteins involved in degradation and synthesis. They soon realized the potential of NF- $\kappa$ B, a DNA transcription factor family that Kandarian showed is key to the process of muscle shrinkage.

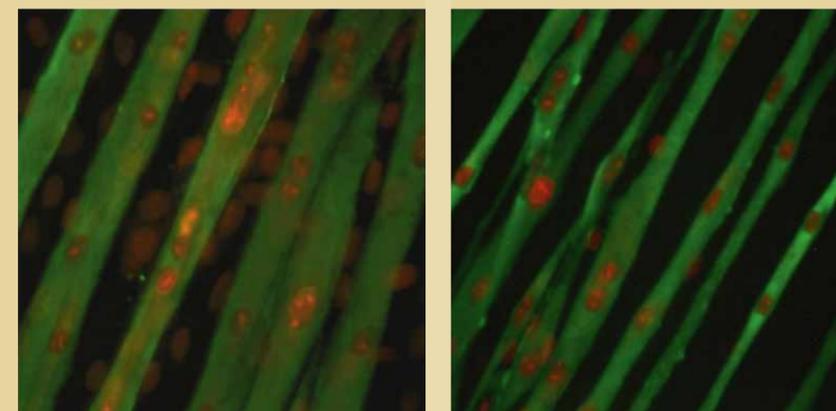
In highly cited work, Kandarian has identified two proteins in this family that are required for atrophy to occur. Now her lab is using a process called ChIP-Sequencing to look across the entire genome—an unprecedented project that involves "Jackman's expertise and a good deal of bioinformatics," Kandarian says. Jackman believes it won't be long before

they've tracked down all proteins involved: "We're doing everything we can to understand muscle wasting and to find ways to stop it with every possible tactic we can imagine," he says, noting that in recent work the lab team has analyzed 28,000 genes present during aging and in cancer cachexia. "Within 10 years, we will know the major genes—and their proteins—that are directly and indirectly regulated by NF- $\kappa$ B in disuse and cachexia muscle atrophies."

The work will have important ramifications in clinical settings, of course, and in geriatric care, but also in another setting where disuse atrophy occurs: outer space. As space agencies prepare for longer-term occupancies of the International Space Station, and longer voyages, exercise alone won't mitigate the rapid atrophy that can befall astronauts in zero-gravity settings. According to NASA, astronauts in space already spend about two hours a day doing resistance exercises, but muscle mass can shrink by as much as five percent a week. After long missions, some astronauts need weeks or months to recover.

Kandarian hopes effective drug interventions are on the horizon. "Muscle affects your whole health," she says—from youth through old age, in health and sickness. "It's a huge metabolic organ. A lot of things go awry, more than you would think, when you lose it." ■

Additional reporting by Andrew Thurston.

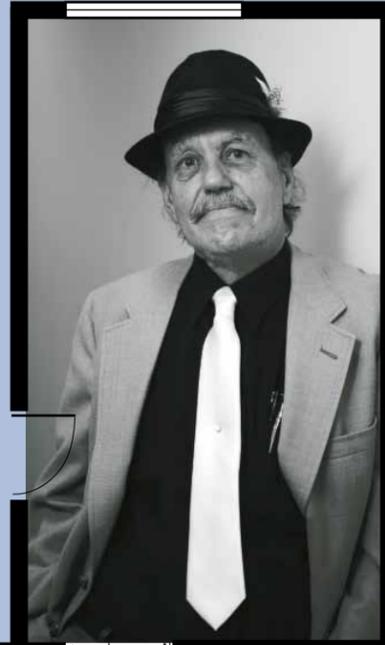


Images courtesy of Susan Kandarian

**These images** show the effect of cancer on muscle fibers—as seen through a microscope. On the left, a normal fiber in a lab culture shows no signs of atrophy. On the right, by contrast, a fiber treated with a protein that's elevated in patients with cancer, catabolic cytokine tumor necrosis factor-alpha, is markedly atrophied. Researchers in Professor Kandarian's lab hope to track all the proteins involved in muscle atrophy.—AT



Assistant Professor Christine Helfrich (bottom left) and interventionist Andrea Halverson (bottom right) are helping Bill (top left), Sherel, George, and many others prepare for homes of their own.



# HEADING HOME

AFTER SURVIVING ON THE STREETS, MANY PEOPLE WHO'VE CONFRONTED HOMELESSNESS LACK THE SKILLS NEEDED TO LIVE IN A PLACE OF THEIR OWN. ASSISTANT PROFESSOR CHRISTINE HELFRICH PREPARES THEM FOR HOME, SWEET HOME.

By Andrew Thurston



Photos by Kalman Zabarsky and Vernon Doucette

**For someone who's suffered** a heart attack and two strokes, lost his home, job, and savings, *and* now has no memory of his life before 1985, Bill is a pretty upbeat guy. Actually, he looks downright happy. After more than a year on the streets and in shelters, Bill is edging closer to having his own place again.

"I'll probably cry," he says, anticipating the moment when he first puts a key in his private door lock. "I'll be happy to be able to go to my own room, lock that door, light up a cigar, cry for about twenty minutes, and then call for my son to come over."

Despite his optimism, Bill's dream is a precarious one. Many people who've lived on the streets are unprepared for a stable life off them. They haven't cooked a meal in years, may never have held a bank account, and likely relied on the emergency room for health care. Having found somewhere to call home, they have little experience of performing the day-to-day tasks that will help them stay in it—a high number land straight back on the streets.

"The funding is for housing, not for rehab," says Assistant Professor of Occupational Therapy Christine Helfrich. She's halfway through a three-year project to help people master the skills they need to cement themselves in society. "The greatest costs are in finding people housing. If once you get someone into housing, they stay in housing, it takes them out of the need to get services from homeless agencies, which are completely overrun."

Helfrich's intervention study includes four 6-week modules covering food and money management, home care and self-care, and safe community engagement. Participants are taught such skills as cooking with a microwave and how to sign up with a primary care provider. She's targeting a broad spectrum of people, from those who are still on the streets after decades to people who've just secured housing or—like Bill—are about to. During the first year of the project, an occupational therapist delivered the training, but the focus is shifting to preparing peer leaders—people who've experienced homelessness or seen it up close—to run the program when Helfrich's funding ends. Bill has already signed up to be one of the trainers.

"It's someone who's been in their situation," he says. "The minute they find out I've been homeless, that I was down, they're like, 'Oh, wait, we can actually trust this guy.'"

Given that many homeless people have, as Bill puts it, "been screwed over quite a few times," that connection could be key. Although Helfrich had pioneered the training modules with an 86-person, in-shelter trial in Chicago, she's never worked with such a disparate group—the participants in the latest project have all been homeless and all have a disability, but have little else in common.

It's already forced a change of approach for the most at-risk. The modules are designed to be taught in groups, with participants sharing ideas, experiences, and lessons with one another. But that didn't work for everyone. Those still spending nights under the stars or in shelters—whether they were living in a domestic violence shelter or were homeless after a prison stint—were understandably wary, rarely showing up at the same time or getting bogged down in arguments when they did.



Learning how to eat well on a budget, Bill (left) and George shop with Andrea Halverson.

Those people now start with one-on-one sessions, gradually moving to work with a partner, and eventually a full group.

The occupational therapist running the project with Helfrich, interventionist Andrea Halverson ('10), says they'd intended this to be a feasibility study, so the occasional change of direction is useful in perfecting it: "One main goal is to meet people where they are, to be realistic." During the budgeting module, she taught participants about setting up a savings account and, when some participants said they'd quit the money management group before they'd quit smoking, about getting good deals on cigarettes.

"It's a harm reduction approach," says Helfrich, who's considering adapting the modules into a summer college preparation program for students with disabilities. "It really challenges your own values. Theoretically, people should follow the food pyramid every day, but when you're homeless or living in poverty... you're not going to get protein every day, so [the question becomes] can you get it every other day? It's something that makes this intervention different—it's not exactly clean and by the book."

Helfrich admits that while some lab-based researchers might balk at her calling the project a study—participants can skip meetings without a penalty and aren't asked to track other comparable services they might be using—she argues that keeping things "extremely messy" gives her a better chance of success.

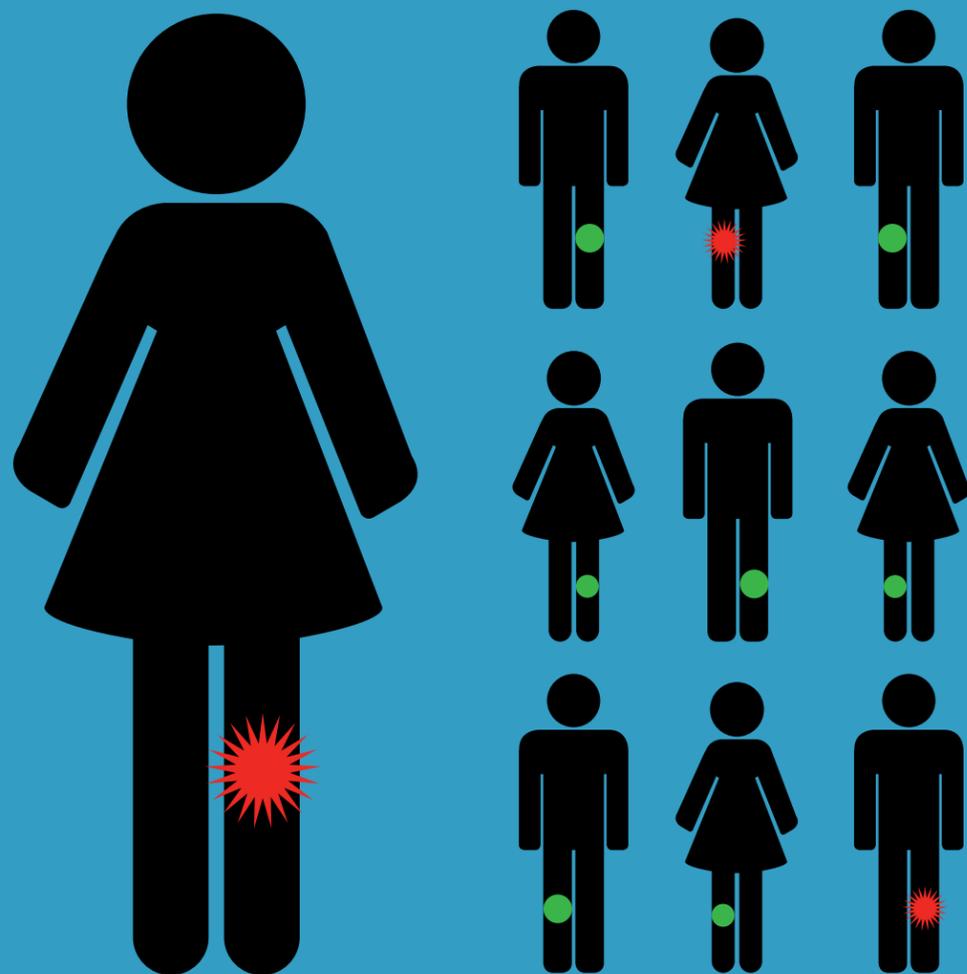
"This is client-centered work," she says. "We're making real-life interventions out in the community with this population. What we're doing is more generalizable to real life *because* we're not controlling everything."

And as Bill knows, when you're on the streets—or heading for them—control is a luxury you don't often have. Fortunately, he's starting to regain some command over his own life. He's just found a part-time job and—after learning how to shop for banking deals during the budgeting module—is putting a little money aside each week for his own place and to start a small college fund for his three-year-old granddaughter. With the life skills he's picked up, there's a good chance Bill's dreams will come true. No wonder he's smiling. **IS**

## Total knee replacement works wonders for 7 out of 10 patients.

### Why isn't it successful for everyone?

By Corinne Steinbrenner



After years of wincing at arthritis pain and avoiding the stairs, you finally agreed to total knee replacement surgery. You spent two hours on the operating table and four days recovering in the hospital. You gritted your teeth through those first delicate weeks, hobbling around with the help of a walker and a prescription for Percocet. You completed 12 grueling sessions at the physical therapist's office and countless hours of recommended ankle pumps and knee bends at home. You progressed from the walker to a cane, and eventually started driving again. It's been more than two years since the surgery. The swelling is long gone and the scar is fading, but you're starting to wonder if all the effort was worth it. You can walk without the cane, but the pain isn't entirely gone, and you're still avoiding stairs.

Frustrating as it sounds, this scenario is not uncommon. Total knee replacement (TKR) surgery is rapidly on the rise among arthritis sufferers: According to the Centers for Disease Control and Prevention, the rate of knee replacement procedures among the elderly in the United States increased approximately 800 percent between 1979 and 2002, and the growth continues. While most people benefit significantly from a knee replacement—regaining the ability to perform daily chores and play weekend games of golf and tennis—a substantial minority of TKR patients continues to suffer pain and physical limitations.

Clinical Assistant Professor Jessica Maxwell (CAS'94, SAR'97, SPH'13) recently completed an epidemiological study to determine the size of that minority. She examined data from the longitudinal Multicenter Osteoarthritis Study, looking for participants who, despite undergoing surgery, were still walking at low speeds or reporting functional limitations (difficulties getting out of bed, standing, climbing stairs, etc.). She found that more than 30 percent of TKR patients fell into this category.

"Currently, about 750,000 people a year are having knee replacements in the United States," says Maxwell, "and by 2015, it's supposed to be over 1.3 million. If you calculate 30 percent of 1.3 million, that's hundreds of thousands of people who won't be doing well."

### STAYING ACTIVE—DESPITE THE PAIN

With this understanding of the scope of the problem, Maxwell is digging deeper into the data to reveal its consequences and causes. In the summer of 2011, she launched a second round of investigation, funded by the American College of Rheumatology and part of a wider arthritis-focused research agenda at Sargent College (see next page), to determine how these disappointing surgery outcomes are affecting patients' daily lives and the risk factors that might predict poor surgery results.

Maxwell's preliminary study found functional limitations among TKR patients; now she's exploring whether—two years or more after surgery—these limitations are affecting their participation in home and community activities. "They might be limited in climbing stairs or standing for a long time," she explains, "but can they still go to church or the library? Can they still go out and meet with their friends? Can they drive to the grocery store?"

Maxwell is among the first researchers to study such participation among TKR patients. She hopes she'll find that the number of people reporting reduced participation is smaller than the 30 percent she found experiencing limited function. "I'm hoping that, although people might have pain with walking or difficulty climbing stairs, they're still being active in their community and going out and engaging in social activities."

For this round of research, Maxwell is again analyzing data from the Multicenter Osteoarthritis Study (MOST). Funded by the National Institutes of Health and administered, in part, by BU School of Medicine, MOST is an observational study that includes more than 3,000 people over the age of 50 who, when they were recruited to the project several years ago, were at high risk for knee osteoarthritis. Hundreds of them have since undergone TKR to address their arthritis pain. Maxwell is also examining data from the Osteoarthritis Initiative (OAI), a similar study with nearly 5,000 participants.

Once she has established how many TKR patients remain limited in function and participation, Maxwell will determine >>

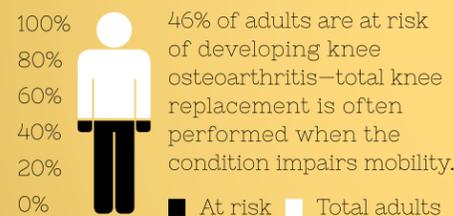
750,

knee replacements are performed each year in the U.S. That's expected to rise to 1.3 million by 2015.

### Could more surgery be better?

Having both knees replaced might improve function, according to Jessica Maxwell's preliminary study results.

### At risk



### Strength training

Guidelines suggest strength training for managing knee osteoarthritis, but only 15% of people over age 65 with the condition are doing any.



Sources: Centers for Disease Control and Prevention, Center for Enhancing Activity and Participation among Persons with Arthritis, and Clinical Assistant Professor Jessica Maxwell.



“WHAT WE FOUND WHEN I DID THE PRELIMINARY STUDY OF FUNCTION IS THAT PEOPLE WHO HAD BOTH KNEES REPLACED, ALTHOUGH NOT NECESSARILY AT THE SAME TIME, WERE DOING BETTER THAN THOSE WHO JUST HAD ONE KNEE REPLACED.”  
JESSICA MAXWELL

Photo by Kalman Zabarsky

>> what makes those patients different from the majority who reap significant benefits from the surgery. She'll do this by examining the detailed data gathered through MOST and OAI and also by conducting interviews with Boston-area residents who've undergone TKR.

**MORE VERSUS LESS SURGERY**

Similar studies for other conditions have identified specific groups of patients who aren't good candidates for surgery and should be discouraged from electing it. “In back surgery, that was the case,” says BU Professor of Medicine David Felson, a MOST principal investigator who is aiding Maxwell in her research. “There were people with particular psychological profiles who just never did well after back surgery, and that became important in the referral process” for such surgery.

Felson, however, has a hunch that won't be the case with TKR. Rather than identifying a group of people who should avoid knee surgery, he suspects Maxwell's research will uncover clues doctors can use to help certain patients come through the procedure more successfully. “If we figured out, say, that their preoperative weakness was a big factor in affecting their long-term course after surgery,” he says, “we might work on strengthening them in advance.” It's likely, he says, that Maxwell's research will identify groups of patients who should be referred for TKR earlier. “It's sort of ironic given the explosion of rates of this surgery,” he says, “but it may be that some people aren't doing well because we waited too long.”

Maxwell's initial findings do, in fact, point to a need for more—not less—knee surgery. “What we found when I did the preliminary study of function,” she says, “is that people who had both knees replaced, although not necessarily at the same time, were doing better than those who just had one knee replaced.” Maxwell plans to further analyze these results, but it appears, she says, that many TKR patients who've reported functional limitations have a second bad knee that should also be replaced.

As Maxwell continues her study, she expects to uncover other clues to improve surgical outcomes. With rates of knee arthritis rapidly increasing, the research has potential to help hundreds of thousands of people make better-informed treatment decisions and then get back on their feet—and back to taking the stairs. **IS**

**The Big Picture: Arthritis Treatment Advances**

On a sunny spring day, 50 residents of Boston's Roxbury neighborhood met at the Peoples Baptist Church for a free seminar, “Arthritis vs. You: Who's Winning?” The church choir warmed up the mostly elderly crowd—encouraging them to wave their arms and kick their legs as they joined in the lively singing. Boston-area physicians and professors then gave presentations and answered questions about the causes of arthritis and strategies for managing the increasingly common joint disease. “It was a wonderful opportunity,” says Associate Professor of Physical Therapy Julie Keyser. “The people there were enthusiastic, and they had great questions. It was really very powerful.”

The Roxbury forum was the first of many community education programs jointly sponsored by the Arthritis Foundation and a new national center at Sargent College dedicated to improving the lives of people with arthritis. The Center for Enhancing Activity & Participation among Persons with Arthritis (ENACT) is directed by Keyser and was established in 2010 with a \$4 million grant from the National Institute on Disability and Rehabilitation Research.

In addition to its outreach programs, ENACT focuses on conducting arthritis-related studies and on training a new generation of arthritis experts.

“There's a huge need for clinical researchers in rehabilitation,” says Keyser of the latter, “in physical therapy, in occupational therapy, in rehab counseling—important elements of rehabilitation.” ENACT is helping to fill this need by providing fellowships that support four doctoral students at Sargent College with stipends and full tuition. A key component of the fellowship is formal mentorship by faculty from Sargent and BU's Schools of Medicine and Public Health. While housed at Sargent, ENACT involves students and faculty from across the University—from those focusing on health-related disciplines to those at the College of Communication. That's because rehabilitation is inherently interdisciplinary, says Professor of Medicine and ENACT Associate Director Saralynn Allaire. “You need people with various backgrounds,” she says, “to help people maintain their highest function possible.”

ENACT's research agenda currently includes three arthritis-related projects. Among these is Clinical Assistant Professor Jessica Maxwell's investigation into the reasons many patients have difficulty resuming their daily activities after total knee replacement surgery (see story on page 6).

A second project aims to help people with arthritis remain in the workforce. Performing job tasks is often painful for people with arthritis, “so the rates of work disability are high for this population,” says Keyser, the principal investigator on the study. “We're planning to come up with some community-based approaches that will, we hope, help people maintain their employment.”

“THERE'S A HUGE NEED FOR CLINICAL RESEARCHERS IN REHABILITATION, IN PHYSICAL THERAPY, IN OCCUPATIONAL THERAPY, IN REHAB COUNSELING—IMPORTANT ELEMENTS OF REHABILITATION.”  
JULIE KEYSOR



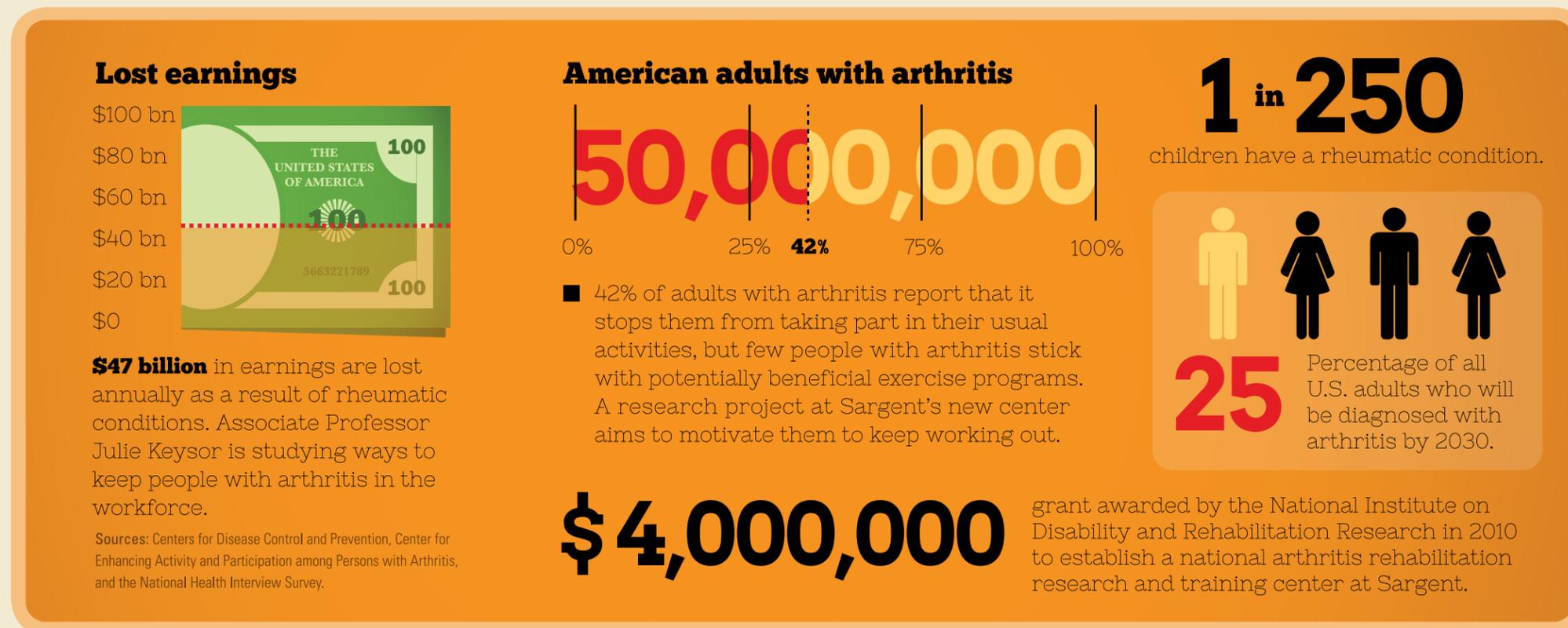
Photo by Vernon Doucette

A third research project will investigate ways to help people with arthritis stick with their exercise programs. Despite strong evidence that strength training reduces pain and improves function for people with arthritis, few patients follow through with recommended exercise routines. Assistant Professor of Medicine Kristin Baker is testing the use of computer-based telephone counseling to motivate older adults with knee osteoarthritis to adhere to strength-training regimens.

With the center promising so many prevention and treatment advances, more people should soon be able to answer, “Arthritis vs. You: Who's Winning?” with an emphatic, “I am.” —CS **IS**

**WEB Extra**

Find out more about ENACT's research—and sign up for webinars, project updates, and more—at [www.bu.edu/enact](http://www.bu.edu/enact).



NEUROSCIENTIST FRANK GUENTHER HAS DECODED THE SIGNALS OUR BRAINS FIRE OUT WHEN WE WANT TO TALK. NOW HE'S WORKING TO USE HIS EXPERTISE—AND SOME TELEPATHIC TECHNOLOGY—TO HELP THOSE WITH SPEECH PROBLEMS.

By Patrick L. Kennedy

**For thousands of years**, before humans ever wrote anything down, we spoke. Noam Chomsky and many other linguists argue that speech is what sets *Homo sapiens* apart in the animal kingdom. “Speech,” wrote Aristotle, “is the representation of the mind.”

It is a complex process, the series of lightning-quick steps by which your thoughts form themselves into words and travel from your brain, via the tongue, lips, vocal folds, and jaw (together known as the articulators), to your listeners’ ears—and into their own brains.

Complex, but mappable. Over the course of two decades and countless experiments using functional Magnetic Resonance Imaging (fMRI) and other methods of data collection, neuroscientist Frank Guenther has built a computer model describing just how your brain pulls off the trick of speaking.

And the information isn’t merely fascinating. Guenther—a professor in Sargent College’s speech, language & hearing sciences department—believes his model will help patients suffering from apraxia (where the desire to speak is intact, but speech production is damaged), stuttering, Lou Gehrig’s disease, throat cancer, even paralysis.

“Having a detailed understanding of how a complex system works helps you fix that system when it’s broken,” says Guenther, a former engineer who left Raytheon (“I hated being a corporate cog”) to earn a PhD in cognitive and neural sciences from BU (graduating in 1993, he now directs that program). “And a model like this is what it takes to really start understanding some of these complicated communication disorders.”

#### PURPOSEFUL BABBLE

Guenther’s virtual vocal tract, Directions Into Velocities of Articulators (DIVA), is the field’s leading model of speech production. It is based on fMRI studies showing what groups of neurons are activated in which regions of the brain when humans speak various phonemes (the mini-syllables that compose all words). The DIVA system imitates the way we speak: moving our articulators (tongue, etc.) and unconsciously listening to ourselves and auto-correcting. When Guenther runs a fresh program, the model even goes through a babbling phase, teaching itself to produce phonemes, just as human babies do.

Guenther and colleagues in his lab, which he recently moved to Sargent from BU College of Arts & Sciences, con-

“IT WON’T COST PATIENTS \$50,000, AND THEY WON’T HAVE TO UNDERGO BRAIN SURGERY. IT’S THE KIND OF OFF-THE-SHELF THING THAT THEY CAN BUY AND USE TO COMMUNICATE WITHIN A DAY OR TWO OF PRACTICING.” FRANK GUENTHER



Photo by Kalman Zabarsky

tinue to perfect the model, but primarily, they’re focused on “using insights from the model to help us address disorders like stuttering,” Guenther says. “What we’ll do is modify the model by damaging it to mimic what’s going on in these disorders.” As they learn more about the physiological differences in the brains of stutterers, for example, Guenther’s team comes closer to “having more precise hypotheses about which receptor systems a drug should target, which should lead us more quickly to a drug that doesn’t cause other behavioral problems.”

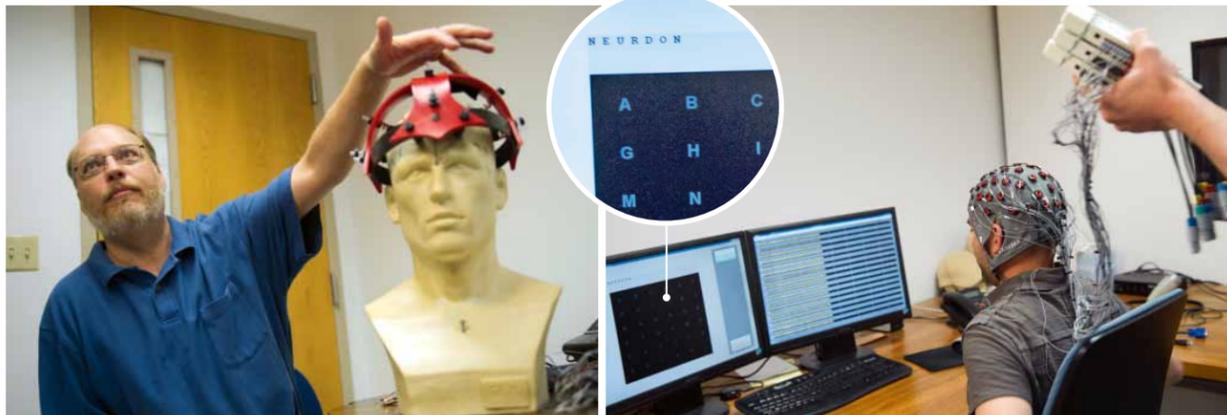
#### GIVING VOICE TO A THOUGHT

A large part of Guenther’s work consists of devising “brain-computer interface methods for augmentative communication,” he says. The most dramatic example has been a collaboration with pioneering neuroscientist Phil Kennedy of Neural Signals, Inc., in Georgia, in which software developed by Guenther’s lab helped a paralyzed man articulate vowels with his mind.

“In locked-in syndrome, the cortex, the main parts of the brain that the model addresses, are actually intact,” says Guenther, explaining the condition of a patient who is physically paralyzed but mentally sound. “What’s messed up is the motor output part of the brain. So the planning of speech goes on fine, but there’s no output.” Guenther had speculated that, “If we knew what their neural signals were, how they were representing the speech, then we should be able to decode the speech. And it turned out that Kennedy and his team had implanted somebody with an electrode in that part of the brain—the speech motor cortex—but were unable to decode the signals.” >>

CAN HE READ

YOUR MIND?



Photos by Kalman Zabarsky

**Pick a letter** and these caps can probably guess which one you're thinking of. Sensors in the caps—the red one manufactured by Frank Guenther, the gray one modified by his team from an existing product—pick up the brain's electrical signals and transmit them to the computer screen. In this experiment, the subject watches a screen full of letters; when he concen-

trates on a single letter, it automatically pops up at the top of the display. Although the technology is in its infancy, it could eventually be a lifeline for those who can't speak. For patients with normal brain function, but faulty muscle control, the caps could help reconnect them with the outside world for a relatively low cost and without potentially risky brain surgery.—AT

>> The volunteer who received the implant was Erik Ramsey; he had suffered a severe stroke following a car crash, and could communicate only by answering questions with “yes” or “no” using eye movements. With a grant from the National Institutes of Health, Guenther and colleagues built Ramsey a neural prosthesis in 2008. With his electrodes hooked up to a wireless transmitter, Ramsey imagined speaking vowels, activating neurons that powered a real-time speech synthesizer (emitting a robotic “ahhhhoouooooeee...”) while the researchers watched his progress on a monitor that showed his formant plane—an X-Y axis graph representing “what we call the formant frequencies—where the tongue is, basically.”

Guenther explains that “by the end of the experiment, he was hitting the auditory targets about 80 percent to 90 percent correctly.”

#### FUZZY MIND READING

There are less invasive neural-prosthetic options, which Guenther's lab is also pursuing. Electroencephalography, or EEG, involves picking up the brain's electrical signals through sensors resting on the subject's head, externally. Guenther's colleague Jon Brumberg, a research assistant professor, is testing an EEG system in which one imagines moving one's left or right hand or foot, thereby moving a cursor on a screen. Another method involves choosing letters by staring at them on an alphabet grid.

These laborious methods have advantages, Guenther says. “First of all, it won't cost patients \$50,000, and they won't have to undergo brain surgery. It's the kind of off-the-shelf thing that they can buy and use to communicate”—albeit slowly—“within a day or two of practicing.”

However, Guenther says, thanks to interference from the skull, EEG signals have limited value. “Imagine an old TV antenna where you get a fuzzy picture. That's what EEG is like.

“For real-time control of a synthesizer to produce conversational speech, I think the best way is going to be intracortical, intracranial, because you're always going to get higher-resolution signals.” And Ramsey succeeded in producing vowels with only two output channels, while “the next system will have up to 96 channels.”

Guenther points out that “these are the initial attempts. It's like the first rockets that went up but didn't even go into orbit. This is going to get more and more refined over the next decades. But it will happen... I can imagine a day when these surgeries become so routine that it's not a big deal. Somebody might wear such a device as a necklace with a speaker on it.”

#### INSIGHTS FOR CLINICIANS

Guenther relishes his work as a pioneer at the nexus of engineering, neuroscience, and now rehabilitation. “Coming to Sargent College has been good timing for me because my earlier career was building up this model of normal human brain function, and now that we're starting to look at the disorders, like stuttering, we're getting insights by talking to clinicians, and getting access to clinical populations, at Sargent.”

What hasn't changed is Guenther's fascination with the human brain. “It's such an unbelievable machine. I've studied computers, and the brain does many things so much better than computers. And if you figure out how the brain works, you understand the mind, and you understand some of life's great mysteries.” **IS**



Photo by Cydney Scott

## Starting A CONVERSATION

TEACHING PEOPLE TO SPEAK AGAIN MOTIVATES A DOCTORAL STUDENT TO PUSH BOUNDARIES IN THE LAB AND THE CLINIC.

By Rachel Johnson

**Imagine knowing what you want to say** but not being able to say it. For people recovering from acquired brain injuries (ABIs)—such as those resulting from accident, stroke, surgery, or cancer treatment—language problems can pose one of the greatest challenges in their recovery, affecting their ability to resume a normal life. Will Evans ('10, '13) has seen how devastating these impediments can be during his clinical fellowship at Boston's Massachusetts General Hospital (MGH), part of his PhD work in speech-language pathology. “There's a lot of grieving,” he says, “because people are dealing with the realization that they might not get to live the life that they were expecting.” Witnessing language loss has motivated Evans to help develop therapies that bring back some level of communication to patients.

He works with adult outpatients at MGH, treating a number of language-related disorders, including aphasia, a problem with the ability to produce or understand language, and dysarthria, a muscle control impairment. The work

allows Evans to put abstract classroom concepts into action. “An adult already had a fully developed language system that was fine to begin with,” he says, “but now something's happened to it. So I have to think, ‘How do I get the best sense of where they are? What are the difficulties that they're having?’ Then I can come up with the strategies and training that will help.”

Evans is working behind the scenes in Sargent's Language Science Lab to help develop some of those strategies. He's been at the lab for the past five years and has won plaudits for research on the use of eye tracking technology to monitor language processing. “The major benefit to using eye tracking is that you can present slightly different versions of similar sentences and see in real-time if the way people read them changes,” he says. “If they reread certain parts more often or take longer on a specific word in one sentence than they do in a similar sentence, you can draw conclusions about how their language processing system is set up.”

“I DON'T WANT TOO MUCH DISTANCE FROM MY PATIENTS BECAUSE I WANT TO HELP PEOPLE, AND I THINK THAT BECOMES HARDER IF YOU CUT YOURSELF OFF. THERE ARE ALL THESE LIFE-CHANGING EVENTS THAT WE CAN'T FIX; BUT THERE ARE OTHER THINGS WE CAN TAKE ON.”

WILL EVANS (SHOWN AT MASSACHUSETTS GENERAL HOSPITAL)

But, even as Evans and other researchers make technical advances in diagnosis and treatment, regaining speech functions after an ABI can be a draining process—for both patient and clinician.

“It's really important to address these emotional aspects,” says Evans. “I don't want too much distance from my patients because I want to help people, and I think that becomes harder if you cut yourself off. There are all these life-changing events that we can't fix; but there are other things we can take on.”

Eventually, Evans wants to research, teach, and work with patients. Earning his PhD will enable him to do all three: “Being a professor lets you add to the body of knowledge, so people in general can receive better help. But I love working directly with patients, too.” Although his current dilemma is whether to teach, study, or treat first, he says all three routes are driven by the same ambition: “I want to help increase the knowledge of how the brain works and how knowledge is processed, and also to connect that to helping actual patients in the real world.” **IS**

ATHLETIC TRAINER SHARI DAVIS  
IS REVITALIZING A BOSTON HIGH  
SCHOOL WITH SPORTS MEDICINE  
AND LIFE LESSONS.

By Jessica Ullian

## The Hometown Role Model



Photos by Cydney Scott

Shari Davis (right) is using her athletic training skills to give back to her childhood neighborhood.

At first glance, the athletic training room at Boston's English High School seems standard-issue: a stack of multicolored exercise balls in one corner, resistance bands attached to the wall, a locked closet housing the first-aid equipment. To gain a real appreciation for the cinder-block room in the school's basement, ask licensed athletic trainer Shari Davis what type of equipment she had just a year ago.

"Band-Aids," she says. "And tape."

Davis ('10, '12), a student in Sargent's applied anatomy and physiology master's program, transformed the room at English High by winning a \$1,000 grant from the nonprofit organization Athletic Trainers of Massachusetts. She's also at the forefront of a different kind of transformation—a shift in the culture of athletics and achievement in Boston public schools. Davis came to English High for a clinical rotation as an undergraduate in Sargent's athletic training program, and has remained there part time for two years—she's also incorporated the work into her graduate degree—as the school's only athletic trainer. In that time, she's learned that in a resource-poor system, sports medicine is only part of the job. Between treating on-field injuries and scheduling preseason physicals, she's the go-to for students with questions: about personal health, about college, about what the future might hold for them. For Davis, who grew up near English and attended Boston public schools herself, this work isn't a job; it's her responsibility to her hometown.

"There will always be people jumping at the opportunity to treat a Division I athlete, but there aren't a lot of people jumping at the opportunity to treat teenage athletes," says Davis, who medaled in tae kwon do at the Junior Olympics during high school. "I could have used this, so I'm willing to do it."

Boston Public Schools currently employs just one part-time athletic trainer for its entire system (that's one athletic trainer for 18,050 ninth to twelfth graders), so the Sargent College students who perform their clinical rotations at local high schools fill a major void when it comes to clearing students for participation, treating in-game injuries, and developing rehabilitation programs. But this student population's needs aren't confined to the baseball diamond or soccer field. English is America's oldest public high school, but one of Boston's most troubled: in 2007, it was designated as "chronically underperforming" by the Massachusetts School and District Accountability and Assistance system, and three-quarters of the students are from low-income families. The student-athletes there deal with plenty of common issues—recuperation, performance improvement—and a few that are more specific to their community.

"In another environment, you may have an injured patient whose challenge to participation is, 'How can I get the best equipment? How can I shave a second off my time?'" says Sargent Clinical Associate Professor Mark Laursen, BU's director of athletic training services. "In this environment, your patient's challenge might be, 'How am I going to get on the bus? How can I get home?' And often, Shari is the only health care professional they see regularly over the course of the year."



"THERE WILL ALWAYS BE PEOPLE JUMPING AT THE OPPORTUNITY TO TREAT A DIVISION I ATHLETE, BUT THERE AREN'T A LOT OF PEOPLE JUMPING AT THE OPPORTUNITY TO TREAT TEENAGE ATHLETES. I COULD HAVE USED THIS, SO I'M WILLING TO DO IT."

SHARI DAVIS

To address some of these issues, Sargent and BU School of Medicine launched the BU Sports Health Initiative in 2007; it provides Boston's student-athletes with access to a full spectrum of health care—starting with routine physicals—from BU athletic trainers and physicians. The program is currently in place at English and at Chelsea High School; Sargent faculty hope to expand it to other Boston Public Schools in the coming years, having seen the relationship benefit the college and high school students involved.

"The athletic directors often comment on how valuable it is for their students to see our students doing something practical and achievable, and that makes college seem more accessible," says Sara Brown, a clinical associate professor of athletic training at Sargent. "From my end, it's really fascinating to hear from my students, who are often shocked by what these student-athletes are dealing with on a daily basis. It makes us feel that they're understanding that there's a big world out there."

Davis, however, never experienced that culture shock—a neighborhood kid, she'd been coming to English for her martial arts training since age seven. Students at the school recognize her as one of their own, and even with the medical school faculty now available to them, they frequently turn to Davis when they need answers. She's at the school four days a week, and when the final bell rings, for the first hour her athletic training room is, in her words, "mayhem."

"There are people who just like to be here—some of it is a role model type of thing," she admits. "We talk about nutrition, sexual health, college applications. A lot of them don't have a support system at home that says, 'You have options.' When students come to me, they can ask those kinds of questions as well."

"She has been tremendous," says Barry Robinson, the athletic coordinator at English High. "She has brought professionalism to our athletic department, but she's humble. She doesn't say, 'You better do this.' She explains it to kids in their kind of language, and gives respect."

Davis will earn her graduate degree in 2012, but she has no desire to move on to a school with better funding or flashier facilities. Having established athletic training in her old neighborhood, she's determined to stay and help it flourish.

"What I would really like is to see athletic training expand, and this accessibility to health care grow," she says. "There's such a huge need here that there's nowhere I'd like to be more." ■

A PROFESSOR'S VOLUNTEER EFFORT AT A LOCAL FOOD PANTRY HAS SPARKED A RESEARCH PROJECT THAT COULD CHANGE NUTRITION OPTIONS FOR FAMILIES IN NEED EVERYWHERE.

By Sheryl Flatow

# From Nutrition Lab to Family Table



Photo by Cydney Scott

Roberta Durschlag (right) and Alison Books, a Sargent alum, are giving families in need healthier options.

**Roberta Durschlag**, clinical assistant professor and director of nutrition programs at Sargent, has been volunteering for years at Family Table, the food pantry of Greater Boston's Jewish Family & Children's Service (JF&CS). Now she's using her skills as a scientist and dietitian to spearhead a study that has the potential to improve the nutritional health of Family Table's recipients.

Family Table, which is the largest kosher food pantry in Eastern Massachusetts, serves some 320 families each month, Jewish and non-Jewish, providing them with about a third of their groceries during that period. "We partner with 64 synagogues and day schools to bring in food every month for these families," says JF&CS Director of Hunger and Nutrition Alison Books ('04, '05), a graduate of Sargent's nutrition program who previously worked at BU's Nutrition & Fitness Center. She was hired by the nonprofit to introduce nutrition programs with the aims of alleviating hunger and improving the nutritional health of clients. "One of the first questions I was asked when I came here was how could I improve the nutritional quality of the food that we provide. There were two areas I identified immediately. One was the need for fresh or frozen produce; the other was that we were providing a limited amount of whole grains, and I wanted to change that as well.

But I also knew from my background at Boston University that if, as a nutrition professional, I went ahead and made changes without learning what clients wanted, I wouldn't know if I was addressing their needs."

Eager to use change as a learning opportunity, Books sought advice from Durschlag, her former advisor. "I told Alison it might be good to make this a research project," says Durschlag. "In addition to looking at what was available in the food pantry when she came in, we could also figure out what else people were eating. Then we could implement an intervention, and assess them again to see if our intervention brought about change."

The study was done in two phases, with 24 families volunteering to take part in the first phase, and 26 in the second. (To qualify, a family had to have at least one child aged 18 or younger.) The initial part of the study took place in 2010, and consisted of a phone interview and a written survey. A graduate student conducted the phone interviews, which were done at random to determine precisely what foods people were eating on a particular day. The extensive written survey was designed to find out what kinds of foods clients would like to receive from the food pantry; whether they were interested in following a healthy diet; and what barriers, if any, were keeping them from following a healthy diet. >>

Around one-third of adults at the Family Table food pantry were at risk of high cholesterol.



Fruit consumption didn't meet intake requirements for 65% of people supported by the pantry.



More than 75% of recipients were sometimes or often concerned about not having enough food.



## SCIENCE AT THE FOOD BANK

Before she set to work improving the health of the families relying on one of New England's largest kosher food pantries, Clinical Assistant Professor Roberta Durschlag needed to know what she was up against. In a nutritional assessment survey, she studied the body weight, well-being, and diet of food bank participants. The results, presented to the American Dietetic Association in 2010, showed the critical importance of her work. Some 80% of adults and 22% of children using the Family Table

pantry were overweight or obese, with most eating foods—scant on whole grains, bursting with added sugar and sodium—that put them at increased risk of chronic disease. But there was hope in the statistics, too: 68% were interested in eating a healthier diet and 61% in losing weight. The biggest barrier to healthy living? Cost: three-quarters battled food insecurity. And that, of course, is where a food pantry can really make a difference. —AT

“RECIPIENTS ARE NOW GIVEN FRESH PRODUCE EVERY MONTH,” SAYS ROBERTA DURSCHLAG, “AND THEY’RE NO LONGER GETTING GRAHAM CRACKERS AND FRUIT JUICE. ALISON’S MADE SOME TREMENDOUS CHANGES.”



>> Based on the results of that data, the goal for the second phase of the study was for Family Table recipients to eat more whole grains. The intervention took place in February and March of 2011. “Along with their regular monthly distribution, the participating families received an additional distribution of whole-grain products,” says Durschlag, who presented the initial assessment and the intervention plan with Books to the American Dietetic Association national meeting in fall 2010. “They were also given a lot of educational information, including recipes. So if we gave out whole-grain penne, there was a recipe in their bag for a tasty and cost-effective way to prepare it.” Follow-up phone interviews were conducted in June and July to learn whether recipients had followed through with changes to their whole-grain consumption. The results will be available in late 2011.

Meanwhile, Books has already improved the quality of food being distributed by JF&CS. “Recipients are now given fresh produce every month,” says Durschlag, “and they’re no longer getting graham crackers and fruit juice. Alison’s made some tremendous changes.”

Books adds, “We started providing fresh produce before the research study began, so it was something we couldn’t then measure. But one of the questions in the first phase of the study was, ‘Does the fresh produce provided every month help your family eat more produce?’ The overwhelming answer was yes, and they also requested more. So we know on some level that the fresh produce is effective.”

Once the final data is analyzed, Durschlag and Books will determine their next steps. “If we didn’t make a difference, we’ll think about what we can do to make a difference,” says Durschlag. “And if we did make a difference with whole grains, can we do this with other foods? Our interventions will continue to be designed around the particular needs of this population.”

If this initial intervention proves to be a success, it could have an effect beyond one food pantry. “We can only hope that the combination of exposing people to these foods and giving them recipes will increase their consumption,” says Durschlag. “That’s what dietitians do: we educate by teaching people how to use what they’re given. That’s the hypothesis we’re testing. If it works in our food pantry, our hope is that it will also work in other food pantries.” **IS**



Photos by Cydney Scott

Families at the Family Table food pantry are picking up healthier ingredients—and recipes to help incorporate them into everyday meals. Roberta Durschlag and Alison Books (top right) hope their formula for combining education about and exposure to better foods will be replicated nationwide.

**WEB Extra**

Watch Alison Books talk about putting nutrition science to work in the real world at [www.bu.edu/sargent/alison-books](http://www.bu.edu/sargent/alison-books).

# Tourist TRACTION

TO FIND OUT MORE ABOUT THE WAY WE WALK—AND GET KIDS EXCITED ABOUT RESEARCH—A SARGENT PROFESSOR TOOK HER LAB TO BOSTON’S MUSEUM OF SCIENCE.

By Annie Laurie Sánchez

**I stride down the walkway**, the excited murmurs of the crowd filling my ears. But this is no catwalk, nor a red carpet. This seemingly ordinary 12-foot by 3-foot runner is a gait carpet, loaded with sensors that measure my footsteps and transmit that data to a computer. At its end, a separate mat records foot shape, arch height, and how pressure is distributed during walking. My onlookers are visitors to the Museum of Science, Boston—children and parents—waiting for their turn to participate in a research project examining how such factors as height, weight, stride, and the bones of the feet relate to walking patterns.

The data, including mine, was collected at the museum by Assistant Professor Simone Gill as part of the Living Laboratory, a program that educates the public through participation in or observation of active science research projects. By gathering data at the museum, Gill, an occupational therapist, says she was able to include a varied cross-section of the population, especially children. She hopes the broad sample will help her find out how physical determinants like weight and bone structure influence walking habits—knowledge occupational therapists can use to help individuals modify their gaits for the different demands of their environments. Gait modification is Gill’s specialty, and she has focused her recent research on childhood obesity and how weight affects the ability to adapt walking patterns, like picking up the pace in order to get safely across a street, or preventing a fall on uneven terrain.

For this latest project, she teamed up with Jeremy DeSilva, assistant professor of anthropology at BU College of Arts &



Photos by Cydney Scott

Assistant Professor Simone Gill (above) and Jeremy DeSilva (top left), a BU assistant professor of anthropology, took their research on walking habits to the Museum of Science in Boston. They tracked museum visitors on a gait carpet—and added some more old-fashioned leg measurements—to study how factors such as height and foot structure relate to walking patterns.

Sciences, whose specialization is in the evolution of human feet and ankles—specifically their bony morphology, or bone form and structure—and how it relates to walking. As a physical anthropologist, DeSilva is looking at the connection between the bones of modern human feet and walking patterns; he can then compare fossilized early human foot bones and even fossilized footprints to discover how today’s foot structure and its role in how we walk evolved.

“We’ve never looked at this together before,” says Gill. “I’ve done a lot of work looking at how children and adults adapt their walking patterns to cope with changes in the environment, but in my area there hasn’t been very much work looking at morphology and how that ties into the ways that people actually move: the formation of their bones and how that correlates to function.”

That the project found a home in the Museum of Science’s Human Body Connection exhibit, a potpourri of interactive stations and human anatomy facts, was particularly exciting for Gill and DeSilva. “One of the things that I love the most is that we had a chance to educate people in the community about what we’re doing,” Gill says, “so they were participating in the work and through that, learning about science and about their own bodies.” DeSilva seconds that: “We had an opportunity to work with people of all ages, talking to them about something they are all familiar with—feet and walking. If our curiosity and enthusiasm for what we do inspired some young visitors to the museum, we have contributed well beyond just understanding how the foot works.” **IS**

IT IS POSSIBLE TO RECOVER FROM A PSYCHIATRIC ILLNESS—NO MATTER WHAT COUNTRY YOU LIVE IN. MARIANNE FARKAS TRANSLATES LESSONS LEARNED IN THE U.S. FOR A GLOBAL AUDIENCE.

By Bari Walsh

## Globetrotting, Translating, and Healing



Photos by Cydney Scott

Marianne Farkas keeps an exhausting international travel schedule, taking recovery advances around the world.

**Thirty years ago**, receiving a diagnosis of serious psychiatric illness effectively marked the end of one's hopes and dreams. The prognosis was long-term deterioration, says Marianne Farkas, and services were characterized by hopelessness—a dark loop of medications and hospitalizations.

Since then, Sargent College's Center for Psychiatric Rehabilitation (CPR), where Farkas is the director of training and international services, has championed a way out of that destructive cycle. Along with a growing roster of international partners, CPR has helped shape a dramatically new view of psychiatric disability—one that affirms that not only can it be treated more effectively, but that people can return to a meaningful life.

"In every other medical field, if you want a breakthrough, you don't study the people who relapse, you study the people who survive," says Farkas (81). "And yet our literature was replete with relapse, return to hospital: 'Why did people relapse? Why are they unmotivated? Why do they drop out?' That was really the sum total of a long period of professional literature."

Farkas and her colleagues took a different approach to psychiatric disability: they applied the principles of rehabilitation. "You start from the perspective of: What does this person want out of life? What is the major role that this individual hopes for, either at home, in education, or at work?" Farkas says. "And then you look at people's strengths and deficits related to those valued roles. We developed a whole technology to do that."

Through the 1990s, as the practices of recovery-oriented rehabilitation became more established, "We started to see that, guess what? Some people had moved beyond their rehab goals," Farkas says. "We started talking about actual *recovery*." Her team studied the techniques of people who had succeeded at creating meaningful lives after a diagnosis—returning to school, starting a new career, improving their physical health. They identified values that were key to that process, and then looked to see how those values could be reflected in mental health services. They called it "values-based practice"—protocols and programs that support principles of self-determination, hopefulness, and full partnership, among others. It's an approach that's found resonance among providers around the world.

"People with schizophrenia live in Papua New Guinea as well as in downtown New York," says Farkas. "Their trajectory to a meaningful life is not going to be any different, except what that meaningful life will look like is different."

Teasing out those differences, helping to define what a meaningful life can look like for people with serious psychiatric disabilities in Boston, in Singapore, in Jerusalem, has made Farkas a global leader in the field. Since the mid-1980s, she has carried CPR's recovery-based rehabilitation techniques to more than 20 countries, into cultures where approaches to health care—and to mental health itself—vary widely, and where the values that underpin notions of a meaningful life also vary.

In New Zealand, she helped build a mental health curriculum in the occupational therapy department of a univer-

"WHEN YOU HAVE AN IDEA THAT RESONATES, IT ISN'T SO MUCH ABOUT TRANSLATING IT TO ANOTHER LANGUAGE; IT'S ABOUT TRANSLITERATING AND TRYING TO ANALYZE A SOCIETY IN SUCH A WAY THAT YOU CAN UNDERSTAND WHERE THEY ARE IN THEIR THINKING ABOUT RECOVERY."  
MARIANNE FARKAS



sity. In Israel, her team is in the middle of an ambitious project to change the curriculum in community mental health at two universities, help begin a new case management service, and provide input to the Ministry of Health on developing recovery-oriented services.

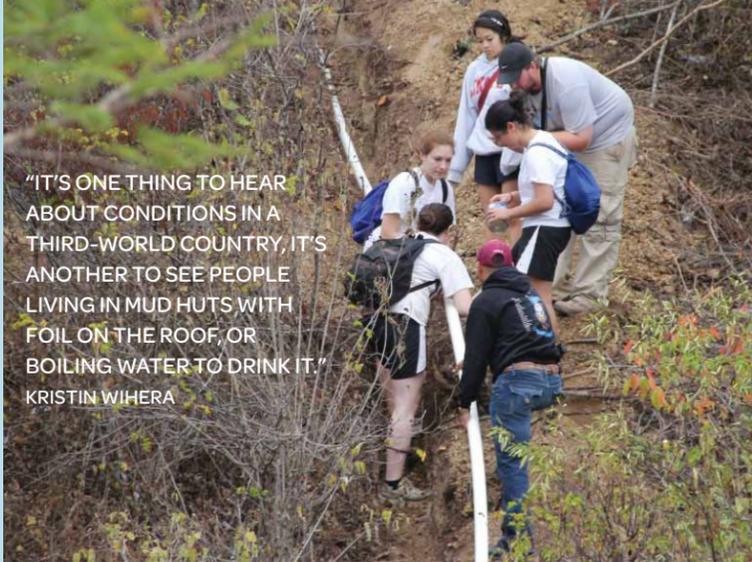
And in Sweden, which hosted CPR's most complex international project, "We spent 12 years helping to change the culture of the regional mental health and social services delivery," says Farkas, who speaks seven languages and understands a few more. The center worked with agencies across the southern part of the country on outpatient services, vocational rehabilitation, residential services, staff training, and changing management structures to give people in recovery a voice.

"When you have an idea that resonates," she says, "it isn't so much about translating it to another language; it's about transliterating and trying to analyze a society in such a way that you can understand where they are in their thinking about recovery. What I try to do when I go to another country is to understand what the problem is as they define it. And then I can see which techniques and methods that we have would be a solution to that problem; then I can adapt them to fit that problem-solution paradigm."

In a country like Sweden, for example, with a big social safety net, she found that alleviating poverty was not an issue, and that self-determination, an important value in U.S.-based conceptions of recovery, was not compelling. "But personal involvement and partnership—also important values in recovery—were things they *did* understand. They were very concerned about the marginalization of people with psychiatric disabilities, because it's a country with a strong sense of collective responsibility. So that's where we started."

That flexibility—balanced with commitment to the non-negotiable ideals of recovery—is key, since bumps crop up with little warning. The project in Sweden fell apart when new political leadership wanted to erase what the previous government had done. "But the 300 people we trained in Sweden are still there," says Farkas. "They've picked up where we left off." **IS**

# Seven Days TO CHANGE A LIFE



"IT'S ONE THING TO HEAR ABOUT CONDITIONS IN A THIRD-WORLD COUNTRY, IT'S ANOTHER TO SEE PEOPLE LIVING IN MUD HUTS WITH FOIL ON THE ROOF, OR BOILING WATER TO DRINK IT."  
KRISTIN WIHERA

Students install piping for a village in Honduras. Photo courtesy of Stephanie Joe

AFTER A WEEK OVERSEAS BUILDING LOCKABLE LATRINES AND REPLACING DIRT FLOORS WITH CEMENT ONES, STUDENTS COME BACK WITH A NEW VIEW OF THE WORLD—AND THEMSELVES.

By Sheryl Flatow

**Seeing orphans without shoes** on TV is heartbreaking; spending time with them in an impoverished Honduran village can be life-changing. Volunteers with the student-led health and sustainable development organization Global Brigades often find that helping improve the lives of those less fortunate has a lasting effect on them as well.

Global Brigades runs nine programs, four of which have chapters at BU: Business, Medical, Public Health, and Water. Students spend a week in an underserved country—most often Honduras, but also Panama and Ghana—working with locals on projects that have long-term impacts on individuals and communities.

Sargent's Kristin Wihera ('13), a junior majoring in human physiology, and Stephanie Joe, who graduated in May 2011 with a degree in health science, did not have lofty reasons for going to Honduras initially. Wihera says she went on her first public health brigade because "my roommate was going." Joe's first trip was as part of a medical brigade which, at the time, was the only brigade on campus. "I was a pre-med student and I thought, 'It's just seven days,'" she says. "I had no expectations."

Once there, everything changed. "It's one thing to hear about conditions in a third-world country," says Wihera, "it's another to see people living in mud huts with foil on the roof, or boiling water to drink it."

As part of Public Health Brigades, Wihera and others focused on four construction projects for one particular family: replacing dirt floors with cement floors; building a clean, more sustainable wood-burning stove with a chimney; making a *pila*, or water storage unit; and creating a latrine with walls, a door, and a roof. "They can actually lock it to keep livestock out," says Wihera, who took her second trip to Honduras in 2011 and is now on the executive board for Public Health Brigades at BU.

Generally, before Public Health Brigades arrives at a house, Water Brigades has been there setting up the water system. Joe cofounded BU's water brigade with Xiao Wang, a 2011 graduate of BU College of Arts & Sciences, and has been to Honduras four times: twice as part of Medical Brigades, and twice as part of Water Brigades, which works on projects important to the entire community, including building dams.

Joe has dug trenches and installed piping. All the brigades also participate in an education day, when they teach the community about hygiene and other life essentials.

"These trips have changed my whole set of beliefs and what I want to do with my life," says Joe. "Before I went to Honduras, I never thought about drinkable water or free health care or a flushable toilet. After my first trip, I switched to Sargent from the College of Arts & Sciences, where I was a bio major. Now I'm going to grad school to become a pediatric nurse practitioner, and when I'm done, my goal is to give free health care to third-world countries."

Wihera is in Navy ROTC, so her immediate course upon graduation is already decided. But, she says, participating in Public Health Brigades "opened up a different aspect of health care" for her. "If I were to go into public health, I would definitely want to work in developing countries."

Joe adds, "I now advocate for Water Brigades. Many people take that first trip like I did, not knowing much but willing to give it a shot. Once they get there, though, they realize the great things that students can do." **IS**

## Grant Awards

BU SARGENT COLLEGE RECEIVED \$9,292,875 IN RESEARCH FUNDING IN 2010–2011. HERE'S A SAMPLE OF OUR PROJECTS AND THE AGENCIES SUPPORTING THEM.

Principal Investigator	Title of Project	Agency	Funds Awarded 2010–2011
Helen Barbas, professor of health sciences	Organization of Prefrontal Feedback Circuits	National Institutes of Health (NIH)/National Institute of Mental Health (NIMH)	\$408,695
	Prefrontal Anatomic Pathways in Executive Control	NIH/National Institute of Neurological Disorders and Stroke (NINDS)	\$363,281
	Prefrontal and Amygdala Pathways to Memory-Related Medial Temporal Cortex	NIH/NIMH/National Research Service Award (NRSA)	\$52,386
	Circuitry of Emotion: Integration in Orbitofrontal Cortex	NIH/NRSA	\$28,387
Jason Bohland, assistant professor of health sciences	The Online Brain Atlas Reconciliation Tool	NIH (Cold Springs Harbor subcontract)	\$24,570
Kee Chan, assistant professor of health sciences	IPA: MultiVISN Implementation of a Program to Improve HIV Screening and Testing	Dept. of Veterans Affairs	\$30,110
Wendy Coster, professor of occupational therapy	Computer Adaptive Testing of Adaptive Behavior of Children and Youth with Autism Spectrum Disorders	NIH/National Institute of Child Health & Human Development (NICHD)	\$284,375
	Development of Measures of Participation and Environment for Children with Disabilities	Dept. of Education	No cost extension
L. Clarke Cox, clinical associate professor of speech, language & hearing sciences	Hearing Acuity, Cognitive Aging, and Memory for Speech	National Institute on Aging (NIA)	\$10,253
Terry Ellis, clinical associate professor of physical therapy	Unveiling of the Natural History of Quality of Life and Mobility Decline in Persons with Parkinson's Disease	Davis Phinney Foundation	\$32,000
	IPA: Part 4 Position Date	Dept. of Veterans Affairs	\$6,389
Marianne Farkas, director of training, Center for Psychiatric Rehabilitation, and E. Sally Rogers, director of research	Improved Employment Outcomes for Individuals with Psychiatric Disabilities	Dept. of Education	\$850,000
Marianne Farkas	Innovative Knowledge Dissemination and Utilization for Disability and Professional Organization and Stakeholders	Dept. of Education	\$54,028

Principal Investigator	Title of Project	Agency	Funds Awarded 2010-2011
Marianne Farkas (continued)	Research and Training Center on Disabilities in Rural Communities	Dept. of Education	\$17,511
Mahasweta Girgenrath, assistant professor of health sciences	Evaluation of the Efficacy of RAP-031 Treatment of Dystrophic, Inflammatory, and Regenerative Deficiencies in Merosin-Deficient Congenital Muscular Dystrophy Animal Model	Cure CMD	\$50,000
	Triggering Regeneration and Tackling Degeneration: A Comprehensive Approach for Treating Muscular Dystrophy	Cure CMD	\$50,000
Frank Guenther, professor of speech, language & hearing sciences	Sequencing and Initiation in Speech Production	NIH/National Institute on Deafness and Other Communication Disorders (NIDCD)	\$294,868
	Sequencing and Initiation in Speech Production	NIH/NIDCD (renewal)	\$347,084
	Sequencing and Initiation in Speech Production	NIH/NIDCD	\$142,942
	Neural Modeling and Imaging of Speech	NIH/NIDCD	\$294,868
	Neural Modeling and Imaging of Speech	NIH/NIDCD	\$182,488
	Constructing an Electroencephalograph-Based Brain-Computer Interface for Augmentative Communication	DynaVox	\$90,294
Christine Helfrich, assistant professor of occupational therapy	Life Skills: Transitioning from Homelessness and Isolation to Housing Stability and Community Integration	Dept. of Education/ National Institute on Disability and Rehabilitation Research (NIDRR)	\$199,994
Ken Holt, associate professor of physical therapy	CPS Collaborative Research, Medium: Programmable Second Skin to Reeducate Injured Nervous Systems	National Science Foundation (NSF)	\$51,280
Norman Hursh, associate professor of occupational therapy	The Boston Connects Model of Student Support: Expanding Technical Assistance & Evaluation	Mathile Foundation	\$60,987
Dori Hutchinson, director of services, Center for Psychiatric Rehabilitation	Boston University Suicide Prevention Program	Substance Abuse & Mental Health Services Administration	\$98,815
Susan Kandarian, professor of health sciences	Regulation of Gene Expression in Skeletal Muscle: NF-κB Signaling in Atrophy	NIH/National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)	\$338,964
	Regulation of Gene Expression in Skeletal Muscle: NF-κB Signaling in Atrophy	NIH/NIAMS	No cost extension
Julie Keysor, associate professor of physical therapy	ENACT: Enhancing Activity and Participation among Persons with Arthritis	Dept. of Education/ NIDRR	\$799,983
Gerald Kidd, professor of speech, language & hearing sciences	Core Center Grant—Sound Field Laboratory (Core 1)	NIH/NIDCD	\$230,380
	Spatial Hearing, Attention, and Informational Masking in Speech Identification	Air Force	\$222,838
	Central Factors in Auditory Masking	NIH/NIDCD	No cost extension

Principal Investigator	Title of Project	Agency	Funds Awarded 2010-2011
Swathi Kiran, associate professor of speech, language & hearing sciences	Theoretically-Based Treatment for Sentence Comprehension Deficits in Aphasia	NIH/NIDCD	\$582,783
	Application of Multimodal Imaging Techniques to Examine Language Recovery in Post-Stroke Aphasia	NIH/NIDCD	\$125,102
	Semantic Fracture Analysis in the Treatment of Lexical Retrieval Deficits in Spanish-English and French-English Bilingual Aphasia	American Speech Language Hearing Foundation	No cost extension
Jessica Kramer, assistant professor of occupational therapy	Giving Youth a Voice: A Collaborative Evaluation of the Effectiveness and Feasibility of a Novel Environmental Modification Training for Youth with Disabilities	Noonan Memorial Research Foundation	\$75,000
Cara Lewis, assistant professor of physical therapy	Sex-Specific Movement Differences in Young Adults With and Without Hip Pain	NIH/National Center for Research Resources (Boston Medical Center subcontract)	\$78,286
Melanie Matthies, associate professor of speech, language & hearing sciences	Effects of Hearing Status on Adult Speech Production	NIH/NIDCD	\$35,140
Jessica Maxwell, clinical associate professor of physical therapy	Limitations in Participation Following Knee Replacement	American College of Rheumatology, Research and Education Foundation	\$49,977
Kathleen Morgan, professor of health sciences	Dynamics of the Vascular Smooth Muscle Cytoskeleton	NIH/National Heart, Lung, and Blood Institute (NHLBI)	\$1,749,580
	Subcellular Organization of Signaling in Smooth Muscle	NIH/NHLBI	No cost extension
	Regulation of Contraction of Blood Vessels	NIH/NHLBI	No cost extension
Gael Ormond, associate professor of occupational therapy	Impact of Parenting Adolescents and Adults with Autism	NIH (University of Wisconsin subcontract)	No cost extension
Paula Quatromoni, associate professor of health sciences	The Foxboro Model for Lifestyle Nutrition and Physical Fitness for Students in Grades 1-8	Aetna Foundation	\$25,000
E. Sally Rogers, director of research, Center for Psychiatric Rehabilitation	Instrument to Measure Recovery in Promoting Competence Among Spanish-Speaking Mental Health Providers	Dept. of Education	No cost extension
Zlatka Russinova, senior research specialist, Center for Psychiatric Rehabilitation	Advanced Research Training Program in Psychiatric Rehabilitation	Dept. of Education	\$149,991
Elliot Saltzman, associate professor of physical therapy	Collaborative Research: Landmark-Based Robust Speech Recognition Using Prosody-Guided Models of Speech	NSF	No cost extension
Robert Wagenaar, professor of physical therapy	Continuous Monitoring of Daily Activity Levels in the Home and Community Setting: Differences between Elderly With or Without a History of Falls	Leiden University Medical Center	\$50,430

Principal Investigator	Title of Project	Agency	Funds Awarded 2010-2011
Robert Wagenaar (continued)	Continuous Monitoring of Functional Activities and Movement Disorders in Parkinson's Disease	2010 Coulter Translational Partnership Program	\$50,372
	Continuous Monitoring of Functional Activities in the Home and Community-Based Setting (Boston Medical Center subcontract)	NIH/NIA	\$48,776
Gloria Waters, dean and professor of speech, language & hearing sciences	Assessment of Comprehension Skills in Older Struggling Readers	Dept. of Education	\$399,515
	Functional Neuroimaging Studies of Syntactic Processing (Massachusetts General Hospital subcontract)	NIH/NIDCD	\$41,553
Daniel White, research assistant professor of physical therapy	Factors for Change in Day-to-Day Walking in Knee OA	American College of Rheumatology, Research and Education Foundation	\$125,000
	Positive Effect and Community Walking in Older Adults	NIH (Boston Medical Center subcontract)	\$48,600
	Factors Associated with Day-to-Day Walking in Older Adults with Knee OA	Foundation for Physical Therapy	\$40,000

### Dudley Allen Sargent Research Fund

The Dudley Allen Sargent Research Fund helps graduate students, faculty, and alumni of BU Sargent College meet the expenses of research projects. Initiated in 1966 by the class of 1921, and supported by contributions from alumni and friends, this fund helps foster innovation in health care research. Listed below are the 2011 recipients:

Recipient	Title of Project
Mahasweta Girgenrath, assistant professor of health sciences	Therapeutic Targeting of Signaling Pathways in MDC1A Form of Congenital Muscular Dystrophy
Swathi Kiran, associate professor of speech, language & hearing sciences	Neural Basis of Lexical Semantic Processing in Bilingual Aphasia
Uma Millner, postdoctoral fellow, Center for Psychiatric Rehabilitation	Explorations in the Meaning of Work for Adults with Psychiatric Disabilities
Eileen O'Keefe, clinical associate professor of health sciences	Assessment of Health Status and Social Determinants of Health among Women in the Villages of Gujarat, India

## Faculty in Print

OUR FACULTY'S RESEARCH REACHES AUDIENCES ACROSS THE GLOBE. HERE'S A SELECTION OF PUBLICATIONS AND ARTICLES WRITTEN BY BU SARGENT COLLEGE FACULTY DURING 2010-2011.

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Breitbach, A. P., and **Brown, S. D.** "The Institutional and Professional Benefits of Housing Athletic Training Education Programs in Schools of Health Professions." *Journal of Allied Health*, 40, 39-42 (2011).

**Cermak, S.**, Curtin, C., and **Bandini, L. G.** "Food Selectivity and Sensory Sensitivity in Children with Autism Spectrum Disorders." *Journal of the American Dietetic Association*, 110:238-246 (2010).

Baldelomar, D., and **Cohn, E. S.** "Cultivating Urban Renewal through OT." *OT Practice*, 21 (2010).

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**Salge Blake, J.** *Nutrition & You: From Core Concepts to Good Health*. Pearson

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## Award-Winning Faculty and Students

HERE WE OFFER A SELECTION OF THE AWARDS AND HONORS GIVEN TO OUR FACULTY AND STUDENTS IN 2010–2011 FOR THEIR PROFESSIONAL CONTRIBUTIONS, COMMITMENT TO SERVICE, AND ACADEMIC EXCELLENCE.

Professor **Helen Barbas** and Research Assistant Professor **Vasileios Zikopoulos** were recognized for their work to uncover the structural differences of the brains of those with autism spectrum disorders. The National Institute of Mental Health cited their project, *Changes in prefrontal axons may disrupt the network in autism*, as one of the top 10 research advances of 2010.

Clinical Professor **Ellen Cohn** collected the American Occupational Therapy Foundation's A. Jean Ayres Award, which is given to "clinicians, educators, and researchers who have demonstrated sustained commitment to the application, development, or testing of theory in occupational therapy." She also won the Herbert Hall Award from the Massachusetts Association for Occupational Therapy.

Professor **Frank Guenther** was named associate director of Boston University's new Graduate Program for Neuroscience. The program brings together faculty from Sargent College and the University's School of Medicine, College of Arts &

Sciences, and College of Engineering. Guenther is also chair of the Computational Neuroscience Curriculum Committee. Read more about Guenther's work on page 10.

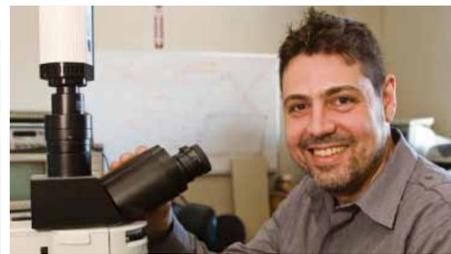
Clinical Assistant Professor **Karole Howland** received the Whitney R. Powers Award for Teaching Excellence. The honor is given annually to one Sargent College professor.

Associate Professor **Julie Keysor** was invited to join the Centers for Disease Control and Prevention and Arthritis Foundation's joint Physical Activity Task Force expert policy panel. She was also made a member of the Osteoarthritis Action Alliance, a national coalition formed by the same organizations.

Assistant Professor **Cara Lewis** was inducted into the Federation of State Boards of Physical Therapy's Academy of Advanced Item Writers. She was also named a KL2 Scholar by the National Institutes of Health Clinical and Translational Science Institute.



**Helen Barbas**  
Photo by Paula Lerner



**Vasileios Zikopoulos**  
Photo by Paula Lerner



**Ellen Cohn**  
Photo by Vernon Doucette



**Frank Guenther**  
Photo by Kalman Zabarsky



**Julie Keysor**  
Photo by Vernon Doucette



**Cara Lewis**  
Photo by Vernon Doucette

## Award-Winning Faculty and Students



### OUTSTANDING SENIOR AWARDS

Every year, Sargent College honors a selection of its seniors for their academic, clinical, research, or community contributions. The 2011 outstanding senior awards winners were: (back row, from left to right) Luwam Ghidei, Emily Alano, Jhill Shah, Meredith Weiner, Lyle Smith, Amanda Patrick, Madeline Ouye, and Matt Hall, and (front row, from left to right) Brittany Irshay, Kathryn Rough, Stacey Hardin, and Sophia Gutierrez. Photo by Linda Haas



### FEATURED AWARD: OCCUPATIONAL THERAPY'S TOP HONOR

The American Occupational Therapy Association has conferred its highest academic prize, the Eleanor Clarke Slagle Lectureship Award, on Clinical Professor **Karen Jacobs**. The accolade is given to those who have "creatively contributed to the development of the body of knowledge of the profession."

Jacobs's distinction continues a period of recent Slagle success for

Sargent College—three of the last five winners are graduates of its occupational therapy master's program.

Jacobs is the director of Sargent's online post-professional occupational therapy doctoral program, the founding editor of *WORK: A Journal of Prevention, Assessment & Rehabilitation*, and chair of an International Ergonomics Association technical committee, Ergonomics for Children and Educational Environments.

Photo by Vernon Doucette

## New Faculty

HEALTH CARE IS AN INTERDISCIPLINARY BUSINESS, AND THE NEW FACULTY MEMBERS AT SARGENT COLLEGE COVER MORE FIELDS OF STUDY THAN MOST.

### Psychologists, Clinicians, Engineers—One College

**Computer science, biomedical engineering, psychology**—as old academic boundaries become more porous, you don't always need a traditional health care background to contribute to well-being.

The four faculty members who joined Sargent College in the fall of 2011 have a blend of clinical, research, and even engineering experience.

According to Dean Gloria Waters, the latest appointments have “excellent interdisciplinary training that allows them to bring a unique perspective to their research and will greatly enhance their teaching.”

Assistant Professor Cara E. Stepp, a biomedical engineer, teaches undergraduate speech science at Sargent and says her classes combine “physics, neuroscience, and physiology to help students understand speech production and perception.” She refers to herself as a “non-clinician with an interest in affecting clinical outcomes,” and this background informs her research, which uses “neural, electrical, and mechanical engineering to rehabilitate disordered sensorimotor function.” She hopes to make advances in treatment for people with Parkinson's disease and swallowing disorders.

One of Stepp's new colleagues in the speech, language & hearing sciences department, Sudha Arunachalam, has a very different background. Assistant Professor Arunachalam, an expert in linguistics and psychology, heads Sargent's Child Language Lab; her research breaks new ground on how young children learn language.

“There is considerable research on word learning in older children, but few researchers have focused on children

under the age of two,” says Waters. “Professor Arunachalam has used innovative techniques to show that very young children are able to infer properties of words from their context with only a single exposure.”

Hoping to benefit from many of the lab-based advances made at Sargent is Clinical Assistant Professor Iris Leigh (a 1976 graduate of Sargent and recent alumna of the BU School of Education). The occupational therapist has taught at a number of institutions in Massachusetts and served as a school-based therapist throughout the Boston area. Her clinical skills are now being used to support Sargent students during their fieldwork programs—Leigh manages real-world assignments and teaches related courses: “Her knowledge of systems and policy, particularly in the school setting, is also an important addition,” says Waters.

While Leigh guides students gaining clinical experience in the United States, international health expert Fernando Ona lends his know-how to those studying health sciences with a global perspective. Waters says Clinical Assistant Professor Ona's work “spans topics such as the migration of Filipina workers to inner-city slums in Europe and strategies to address environmental health disparities, risk, and poverty and decrease disease-related morbidity and mortality in the Dominican Republic.”

For the students at Sargent, being able to call upon such a broad range of experts means that whether they want a career working with computers or with clinicians, they're certain to find a way to help people lead healthier lives.—AT

## BU Sargent College: At a Glance

### WHO WE ARE

Students	Undergraduate	Graduate
Number of full-time students (as of spring 2011)	951	305
Average SAT	1931	n/a
Average GRE	n/a	1219
Faculty		
Full-time	66	
Part-time	65	
Alumni	14,943 in 53 countries	
Clinical Sites	More than 1,400 in all 50 states and 4 countries	

### PROGRAMS OF STUDY

Applied Anatomy & Physiology  
Athletic Training  
Audiology  
Health Science  
Human Physiology (Pre-Med)  
Nutrition  
Occupational Therapy  
Physical Therapy  
Rehabilitation Sciences  
Speech, Language & Hearing Sciences  
Speech-Language Pathology

### SPECIAL PROGRAMS

Combined BS and MPH in Public Health  
Combined BS in Athletic Training and Doctor of Physical Therapy  
Combined BS in Health Studies and Doctor of Physical Therapy

### About Us

Boston University College of Health & Rehabilitation Sciences: Sargent College has been preparing health care leaders and defining health care leadership for 130 years. As knowledge about health and rehabilitation increases and society's health care needs become more complex, BU Sargent College continuously improves its degree programs to meet the needs of future health professionals. Our learning environment fosters the values,

effective communication, and clinical skills that distinguish outstanding health professionals. Our curriculum also includes an important fieldwork component, providing students in every major with substantive clinical experience. Clinical internships are available at more than 1,400 health care facilities across the country. The College also operates outpatient rehabilitation practices that offer a full range of services to the greater Boston community.



Photo by Kalman Zabarsky

### U.S. News & World Report Best Graduate School Rankings

Most of our professional graduate programs are ranked within the top 15 percent in the country. Specific rankings include:

- **Occupational Therapy Program** ranked number 1 (tied) out of 152 programs
- **Physical Therapy Program** ranked number 24 out of 199 programs
- **Speech-Language Pathology Program** ranked number 25 out of 247 programs

### National Certification Board Exam Passing Rates

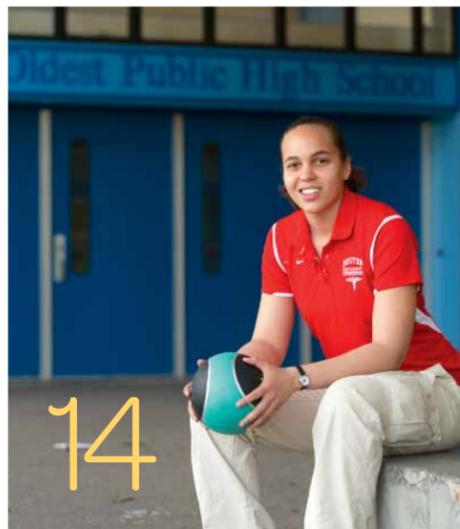
Percentage of BU Sargent College students in entry-level graduate programs who passed the exam the first time (figures for past three years):

Nutrition	99%
Occupational Therapy	97%
Physical Therapy	98%
Speech-Language Pathology	100%



**Boston University** College of Health  
& Rehabilitation Sciences: Sargent College

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**Get in Touch**

If you'd like to learn more about BU Sargent College, we'd like to hear from you. To speak with a professor or student in your program of interest, make an appointment to visit the campus, or find out more about degree programs, financial aid, and degree requirements, please contact us:

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