

# What your body KNOWS

THE BODY HOLDS THE CLUES TO  
FUTURE WELLNESS, AND PREDICTIVE  
HEALTH RESEARCHERS ARE  
LEARNING TO READ THE SIGNS



The Ultimate Donation  
Commencement 2008  
The Beneficent Mulligan

# *the picture of health*

If you're not sick, are you well? A new initiative seeks to define and maintain health, rather than focus on illness—and to engage patients more fully in their own care

BY PAIGE P. PARVIN 96G • PHOTOS BY JON ROU

Walking into Emory's new Center for Health Discovery and Well-Being, you feel more like you're visiting a high-end health spa than a doctor's office. While a typical medical clinic is likely to be bright, busy, and loud, the center is an oasis of calm and comfort. A fountain whispers in the lobby and water bottles labeled with the center's name line the front wall. The decor is straight out of a catalog, the colors soft blue and rich brown, the lighting low. Everywhere there are cozy nooks and comfortable chairs. There is even a room with a table that looks ideal for a massage.

While a regular doctor's office exists largely to treat sick people, the purpose of this place is to assess and maintain health. Still in its early stages, the Center for Health Discovery and Well-Being was established to test the benefits of a proactive approach—a new model for health care.

Situated high on the eighteenth floor of Emory Crawford Long Hospital, the center is the most tangible outcrop of the Emory/Georgia Tech Predictive Health Institute, a collabora-

tion whose seeds were planted during Emory's strategic planning phase more than three years ago.

"We were charged with thinking about what is likely to be a big idea in health care, one where Emory might be in a position to take a lead role," says Kenneth Brigham, associate vice president and director of the institute. "A lot of people are interested in predictive health and the idea that focusing on health and keeping people healthy is likely to be more efficient and effective than waiting until people get sick and trying to get them well again."

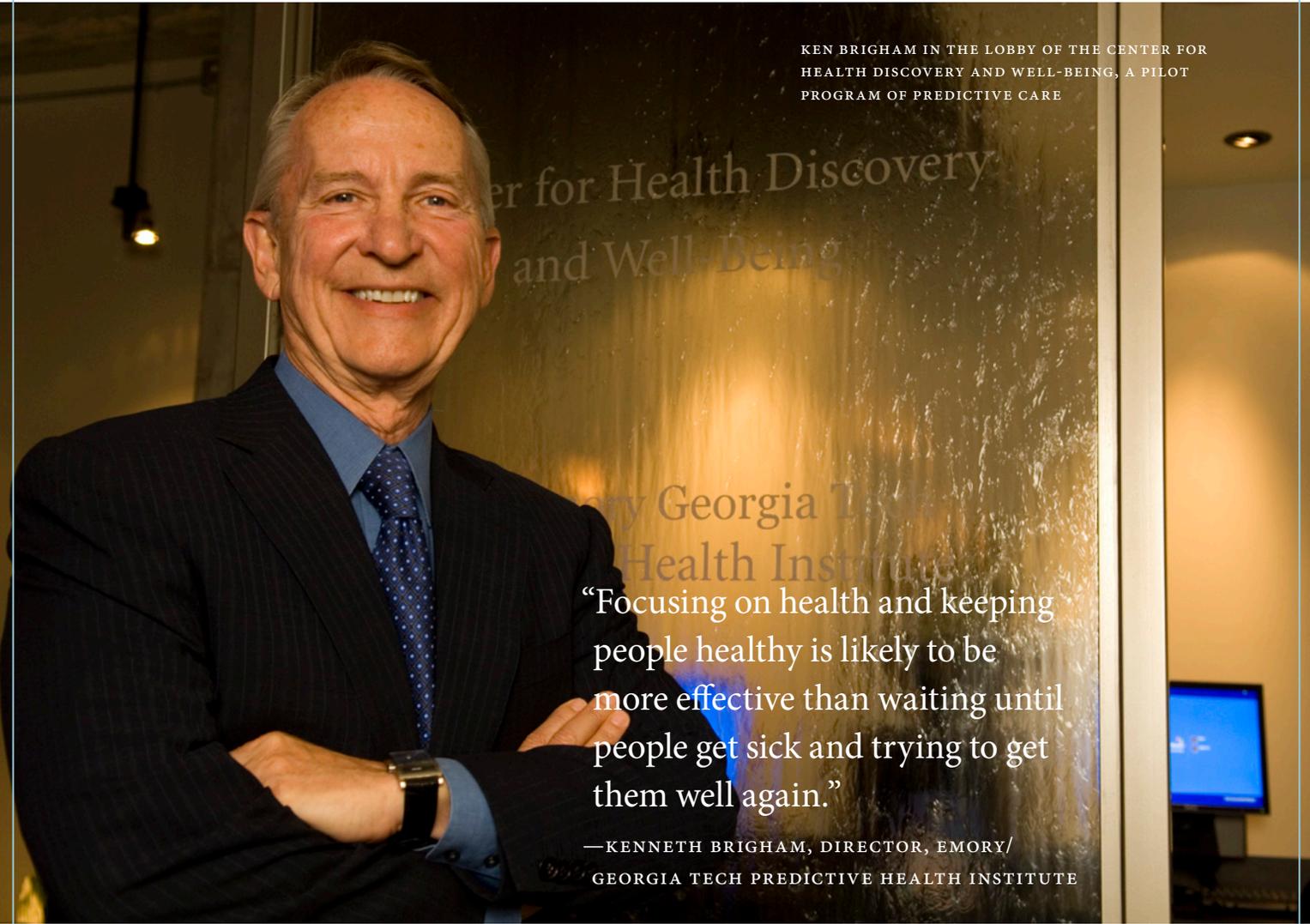
Based on growing national interest and Emory's particular research strengths, predictive health emerged as one of the University's key strategic initiatives for the future. This area of medicine is not new, Brigham says, and it has gone by many different names: preventive health care, prospective medicine, personalized care, and participatory medicine. But most efforts have aimed to prevent specific types of illness, such as cancer and diabetes, while Emory's program is looking at the bigger picture.

"What we mean by predictive health that is somewhat unique is defining health in a positive way," he says. "It is

more than the absence of disease. The biologic term is homeostasis. Trying to define what keeps the body functioning is an area that people have not focused on much."

Brigham, who now spends much of his time in his bright, spacious office at the Center for Health Discovery and Well-Being, says he fell into the study of predictive health purely by accident. Until six years ago, he was director of the Division of Pulmonary and Critical Care Medicine at Vanderbilt University, where he specialized in acute lung injury and repair. He was recruited to Emory as vice chair for research in the School of Medicine and to continue his lung research, which he still pursues at his lab in the Whitehead Biomedical Research Building. But soon after his arrival at Emory, the challenge of defining—and maintaining—optimal health began to capture his attention.

It's a puzzle that intrigues a range of researchers, and not just doctors; the Predictive Health Institute reaches across disciplines to touch on anthropology, law, ethics, and business. Michelle Lampl, Samuel C. Dobbs Professor of Anthropology, is associate director of the institute.



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GEORGIA TECH PREDICTIVE HEALTH INSTITUTE

Like Brigham, “I can’t say that my initial interest was in predictive health,” she says. “I came to this simply to represent the nonmedical side. But the wonderful part is that once we started to talk about the concepts, I realized it’s a natural fit for an anthropologist. In medical school, you don’t really learn about normal—you learn about what goes wrong. It’s a totally different perspective. I have a passion for trying to understand health and normal behaviors.”

Part of the problem, Lampl says, is that Americans in particular don’t take a great deal of interest in their bodies and how they work until they stop working right. With the notable exception of serious athletes, most of us take our physical selves for granted. Oh, we might take our multivitamins, eat our vegetables, and exercise a few times a week, but as long as we’re able to work, sleep, eat, and

socialize, most of us are content to keep our bodily functions at arm’s length.

Then, as soon as we become ill or get hurt, our bodies become the domain of the physician. Our health care culture has fostered a system in which health is the doctor’s job, not ours.

“I’m continually amazed by how much the body is medicalized. The tradition of the body being designed and cared for by a doctor, a fix-it person, is distinctive from other societies and cultures that have a much stronger sense of personal responsibility and involvement,” Lampl says.

And the medical profession compounds the challenge. “People who do medicine as a profession are far more interested in disease than health,” Brigham adds. “It’s the interesting case that intrigues the physician.”

With support from the Robert W. Woodruff Health Sciences Center Fund,

the Emory/Georgia Tech Predictive Health Institute is supporting more than twenty research projects that aim to advance predictive health on a number of different fronts.

One study is examining the effects of inflammation caused by the body’s overzealous immune response to certain threats. Others are exploring how to incorporate economic, epidemiologic, and behavioral risk factors into predictive health models, using Parkinson’s disease and type 2 diabetes as test cases for earlier detection. Another project seeks to understand the genetic conditions that may lead to schizophrenia. Researchers are looking for new ways to predict and protect against Alzheimer’s, chronic lung disease, drug addiction, Lou Gehrig’s disease, and nonalcoholic fatty liver disease.

The initiative also is helping Emory become a leader on the frontier of human



THE SLEEK DESIGN OF  
THE CENTER OFFERS  
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QUESTIONNAIRES

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genetics through large-scale genomic resequencing. While genetic analysis was once prohibitively expensive, new technologies are making it possible for Emory geneticists to generate as many as one billion base pairs of DNA in a matter of days, at a cost of less than .0005 cents per pair. Such improved capability dramatically increases the possibilities for early identification of particular disorders using detailed genetic information.

“Genetics is the key factor in predictive health,” says Stephen Warren, chair of the Department of Human Genetics, where his lab produces some 90 million genotypes a week. “In the future, more common disorders—diabetes, for example—that are due to not one gene but many genes with certain variation will be apparent. Since all disease has a genetic

component to risk, eventually we will be able to assess one’s risks quite broadly.”

**T**he wide-ranging research of the Predictive Health Institute is linked to the work of the Center for Health Discovery and Well-Being, where the first patients are now being enrolled for a major clinical research study on the effectiveness of predictive health care.

A cohort of seven hundred Emory employees is being recruited to undergo a thorough health assessment designed expressly for the project. The purposes of the assessment are twofold: to amass a vast database of new health information that will in turn be used for the basic research projects taking place in the

Predictive Health Institute; and to test the value of highly personalized care by pairing half the patients with a trained health partner over a period of time.

For months, the staff at the Center for Health Discovery and Well-Being have been preparing for the first subjects: testing equipment, fine-tuning the steps, compiling data, and practicing the assessment on each other, friends, and family members.

The predictive health assessment makes a typical annual physical look like a trip to a drive-through pharmacy. Patients must visit the center at least twice, for three to four hours each visit.

During the first visit, they are met by their assigned health partner for an introduction to the center, and then spend at least an hour completing question-

naires on a specially configured laptop. The thorough electronic surveys cover demographic, occupational, and medical information, but also gather hundreds of details about eating habits, stress, sleep, physical activity, personal support, use of alternative medicines, and even spirituality and faith.

Through the collaboration between Emory and Georgia Tech, these questionnaires and the database of assessment results were designed and created by Tech programmers especially for the cohort study. “We’re in the information age for health and biology,” Brigham says. “How we gather, store, and use that information clearly requires technology of the kind Georgia Tech does very well.”

Next, patients provide urine samples and about ten tablespoons of blood, enough to fill more than a dozen small vials for a battery of analyses. Then they go into a dim room and lie on a comfortable table where an ultrasound technician takes pictures of their carotid arteries and arm arteries and tests the stiffness of the blood vessels.

A high-tech body-scan machine measures bone mineral density and body composition—the amounts of muscle and fat. Old-fashioned caliper measurements are taken, too. And during the second visit, patients get on a treadmill to test their capacity for exercise, which is instantly calculated by a computer connected to the machine.

The assessment focuses on four major areas of body function, identified not just for their relationship to overall wellness but also because of researchers’ suspicions that they have something important to tell us about future health—and potential problems. The idea, explains Lampl, is that by the time things go wrong in the body, they are reflecting built-up damage that might have been preventable if someone had caught the process not just early on, but even before it began, at its very origins.

The first of the four areas of focus is oxidant stress, or the body’s use of oxy-

gen. As the body burns oxygen, it generates molecular species called free radicals, which are highly volatile and can injure cell membranes, proteins, and other key functions. In fact, Brigham says, some scientists speculate that aging is actually the slow, cumulative effect of free radicals due to just breathing. The biomarkers for

response, it can do more harm than good; chronic inflammation is increasingly linked to disorders from depression to heart disease. Scientists are seeking more sophisticated measures for inflammation, such as the presence of cytokines—proteins that gather at a site of infection or injury. “The resilience and flexibility

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a person’s oxygen status could be critical to understanding overall health.

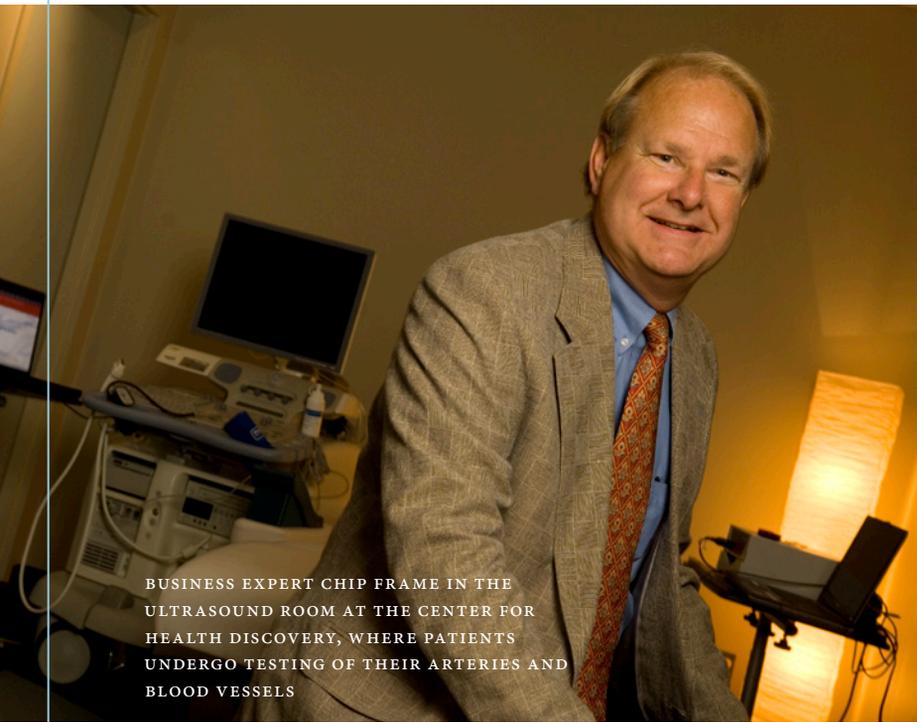
“When you breathe in, oxygen is grabbed from your lungs and blood cells and distributed by all these processes. If they go wrong it’s the equivalent of having a pillow on your face,” Lampl says. “If we can identify the markers for how well your body is using oxygen, that’s huge. How that system functions determines everything.”

The second area of focus is inflammation, part of the body’s arsenal against unwelcome injury or invasion. Although inflammation is a routine immune re-

sponse is really salient for studying the incredible explosion of autoimmune diseases,” Lampl says.

The third area being examined at the center is the broader immune system, specifically how it identifies what to tackle and what to leave alone. Researchers know that immune cells learn to recognize markers on other cells to determine whether they’re friendly or hostile, but understanding exactly how they do that could lead to novel treatments for autoimmune disorders.

And finally, the predictive health study will calculate subjects’ cellular



BUSINESS EXPERT CHIP FRAME IN THE ULTRASOUND ROOM AT THE CENTER FOR HEALTH DISCOVERY, WHERE PATIENTS UNDERGO TESTING OF THEIR ARTERIES AND BLOOD VESSELS



ANI SATZ AT THE CENTER, ON THE TREADMILL WHERE PATIENTS COMPLETE A FITNESS TEST

reserves—basically, the number of stem cells cruising around in our bodies, waiting to be given a job.

“Once a cell is harmed, you need somebody else to step up to the plate,” Lampl explains. “In your blood, you have these circulating progenitor cells that could be anything they want when they grow up. But not that much is known about how this works.” Scientists assume that the more stem cells are present, the better, but that’s a theory they hope to test using the blood samples from the cohort study.

Almost all the results of the Center for Health Discovery and Well-Being health assessment are provided to patients in a thick binder at the completion of the process. Their health partner reviews the information with them and discusses a personal health plan.

“There are no alternatives to this assessment—there’s nothing else like it that we know of,” says Lisa DuPree, center manager and one of two health partners. “Hopefully you can learn a lot about your health. And the partner is a new concept for care.”

The health partner is something like a physician’s assistant, personal trainer, nutritionist, and therapist all rolled into one. DuPree and the other health partner,

## “High-tech health care and predictive information are significant to basic health care delivery.”

—ANI SATZ, DIRECTOR, SCHOOLS OF LAW AND PUBLIC HEALTH

Chesley Lewis, are not medical doctors—DuPree has a master’s degree in exercise physiology and Lewis in exercise science and nutrition. They are specially trained to conduct the assessment and then work with patients on a long-term basis to improve or maintain their health through diet, exercise, and other lifestyle choices. They don’t provide clinical care or diagnose ailments; if the assessment reveals atypical results, they inform the patient and help him arrange to see a physician.

In the current study, half the patients will be randomly chosen to maintain regular contact with their health partner for at least a year after the assessment, while the other half will be provided with the same information but won’t be assigned a partner. At the end of the project, subjects will undergo the health assessment again to show whether or not the support of a partner made a difference.

The decision to train health partners who are not MDs was deliberate, Brigham says. “If you really want to offer care to healthy people, your denomina-

tor goes way up, because there are a lot more healthy people than sick,” he says. “So if we tried to give this health-focused care to everyone and have it run by physicians, the costs would skyrocket. You don’t need doctors to have the very focused knowledge base and skill set that it takes to do what we’re doing here. What you get here is a focus specifically on you and your needs.”

Currently, the health assessment conducted at the center does not include genetic testing, although the database will be used for genetic research. But Brigham acknowledges that genetic analysis should be incorporated into the program, particularly as the range of predictable problems widens and the process becomes more precise.

“Fifteen years ago, we thought genetics would only help diagnose disease,” says Warren of the genetics department. “Now we know that if we delve deep enough into individual genes, we can uncover logical interventions to prevent and treat disease.”

Eventually, Brigham and Lampl hope, a predictive health model like that being tested at the Center for Health Discovery and Well-Being will become mainstream.

“The goal is to revolutionize health care,” Brigham says. “And we believe we can play in that league because of the expertise that is available here. It’s a long-range goal, and we will have to get there incrementally, but we are going to learn an enormous amount about what health is and how to influence people’s health-related behaviors in a positive way. I have to believe it’s a model that will catch on.”

Lampl views the work of the center as a grassroots effort that could gain momentum at the local level. One of the goals of the Predictive Health Institute is to develop an educational curriculum for future health partners.

“If we can train a new cadre of people to enter into this health partner relationship, it will catch on in local communities,” she says. “No one is trying to replace surgery or medication for people who need it. But if we could maintain health better, we would decrease the burden of chronic disease and increase quality of life. We could structurally eliminate the ER being used as the sore throat center.”

One way predictive health care could begin to reach people is through employers. Next year, Brigham hopes, the center’s assessment and health partnership will be offered to Emory employees as part of the institution’s health benefits package. Staff and faculty will be able to choose it, just as they do dental insurance. Emory is seeking other companies to partner with to offer the benefit in a similar way.

Some see predictive health as just one thread of a national trend toward individuals taking firmer control of their health. Ani Satz, an associate professor with joint appointments in the schools of law and public health, is working to establish a Center for Health Law, Policy, and Ethics. She believes the current

system has not kept pace with advances in medical care and is ill equipped to support cutting-edge options like predictive health, including genetic and other types of testing. While such specialties are now available only to a privileged few, Satz thinks that should change.

“Patients should have access to a broad range of services, including predictive technologies,” she says. “Predictive information enables prevention and other basic health care benefits, such as psychological preparedness for the onset of disease and the ability to take advantage of prophylactic options as they become available. With physician



CHESLEY LEWIS AND LISA DUPREE  
WITH THE CENTER’S HIGH-TECH  
BODY SCAN MACHINE

guidance, patients should make tradeoffs among an array of services within the financial limitations they are given.”

Professor of business Chip Frame likens the Center for Health Discovery to a new product being tested for the market: in its early stages, it’s both expensive and hard to access, but as demand grows, costs drop for the provider and the consumer. “Once you understand how to assess the data and learn what does and

doesn’t make sense, you can find where the real payoff points are,” he says.

In fact, an increasing number of companies are offering wellness programs with incentives for participation. “If employers truly want to encourage people to do the right thing, preventive health care should be covered 100 percent by health plans,” wrote **Paul Davis 87MR OOMBA**, CEO of Northstar Health, in a recent article. “In order to achieve 100 percent compliance, employers must require all employees . . . to take more accountability for their health status.”

At the same time, predictive health presents an ethical dilemma: while it has the potential to save money for the health care system and insurance companies by keeping people healthier, it also uncovers information about individual health risk. Although U.S. Department of Labor laws and measures such as the recently passed Genetic Information Nondiscrimination Act protect employees from overt discrimination, some worry that health information could tempt insurance companies to penalize those in poorer health.

A better practice, says Frame, is to tempt patients to comply with good health practices with a carrot, not a stick. Patients are consumers of health care, and convincing them to change their behavior is a marketing challenge, not unlike getting them to change grocery stores or buy a hybrid car.

“Consumers aren’t just automatically going to do what’s good for them,” Frame says. “But if predictive health works, you can make the case that it will save enough money so that you could actually profit-share. Let’s say cardiac arrest costs \$50,000 to treat, but ten years of preventive care costs \$40,000. There’s enough left over so the provider might say, if you go into this preventive plan, we’ll reduce your premiums by ten percent. Is it doable? I think it could be.” ■

TO LEARN MORE ABOUT THE PREDICTIVE HEALTH INSTITUTE, VISIT [PREDICTIVEHEALTH.EMORY.EDU](http://PREDICTIVEHEALTH.EMORY.EDU).

# the man with the health care plan

As he nears the end of his first year as executive vice president for health affairs, chair of Emory Healthcare, and CEO of the Woodruff Health Sciences Center, **Fred Sanfilippo** spends some time with *Emory Magazine*

## What do you feel are the major strengths of the Woodruff Health Sciences Center?

One always needs to start with people because talented people and strong leaders are what make institutions great. There are many really remarkable people here—dedicated people, collegial people, collaborative people. At all levels, they make our progress toward transforming health and healing possible.

Another important strength is the way Emory's governance and administration are aligned and work as teams. It's relatively unusual to have such good synergy of the management and governance structure of an academic health center with the University as a whole. This degree of alignment allows us to collaborate rather than compete . . . to work together to leverage each other's strengths and achieve our complementary and coordinated visions.

We also have a key strategic strength with our geographical location as the only academic health center in Atlanta. This has opened the door to some unique partnerships, and our collegial spirit has nurtured them into productive and mutually rewarding initiatives. Some of our collaborators include CDC, Georgia Tech, Grady, the VA Medical Center, Morehouse, and Children's Healthcare of Atlanta.

These relationships are critically important to our momentum, as are our benefactors and community partners, such as the Woodruff Foundation, the Georgia Research Alliance, and the Georgia Cancer Coalition. Putting together complex alignments like these is hard to do, and Emory does it exceptionally well, both internally and externally.

## Why and when did you first become interested in predictive health?

I've had a strong interest in predictive health for the past thirty years. In the late 1970s and early 1980s, I was doing basic and clinical research in immunogenetics and transplantation at Duke. A lot of my work focused on understanding why genetics did not always predict outcome in organ transplantation. In addition to biologic and genetic characteristics, one had to look at a lot of confounding factors and characteristics of the recipient as well as the donor.

It struck me from my background in math and physics that one should be able to use those methodologies to predict probabilities of different outcomes, as well as the effectiveness of different kinds of treatment. In the case of organ transplantation, the goal was to predict organ rejection and the effectiveness of different treatments on different patients. Over the past fifteen years, I've been interested in extending this approach to basic health care: how to accurately predict an individual's risk of illness, response to illness, and response to treatment intervention.

## Tell us about your work in predictive health before you came to Emory.

When I joined Ohio State University in 2000, a lot of my work was to help build up and align the component parts needed to execute personalized, predictive health, such as genetics, informatics, diagnostics, and decision support tools. We also engaged the institution in a desire to provide health care differently to our employees. We addressed predictive health from several perspectives—

including basic, translational, and clinical research in many disciplines and across all major illnesses. It was such a high priority that we even developed our vision statement, as well as our brand promise, to focus on personalized health.

At Ohio State we administered our own health care plans, and over a two-year planning period with human resources, we developed and implemented many predictive health precepts into the health care plans for employees. For example, we were able to provide financial incentives to encourage employees to participate in personalized health assessments and maintenance. We developed ways for patients and referring physicians to access their electronic medical records, and for patients to get electronic consults with physicians. We also provided our employees with health coaches for health maintenance and chronic disease management. The beneficial results of these approaches were very gratifying.

The work at Ohio State illustrated the importance of addressing not only the science of predictive health, but also the health care delivery component. The ultimate goal is to use the most cutting-edge discoveries and technology—working closely with the patient and the key members of the health care team—to transform clinical practice from disease management to health promotion.

## On a basic level, what are the most challenging ethical issues related to the practice of predictive health, and where do you think the answers might lie?

At the extreme, as in organ transplantation, once one really can predict



FRED SANFILIPPO FORMERLY SERVED THE OHIO STATE UNIVERSITY AS SENIOR VICE PRESIDENT FOR HEALTH SCIENCES, DEAN OF THE COLLEGE OF MEDICINE, AND MEDICAL CENTER CEO

### health care system? How can Emory lead that movement?

As health care becomes truly predictive, best practices will become defined more clearly, and patients and the public rightfully expect us to engage in best practices. At Emory, we can lead change by demonstrating that there are accurate predictive health approaches that improve outcome and by showing that the value of predictive health in both prevention and treatment is significant and

provides real benefit to society.

An important aspect will be to not only develop the data warehouses and tools that can provide great decision support and predictive value based on an individual's unique biology, behavior, and environment, but also to get the information from these tools into the hands of patients and health care providers to help them make decisions.

### Predictive health is a university-wide initiative. What are some ways in which the Woodruff Health Sciences Center can work with non-health components of the University to advance predictive health?

Many aspects of predictive health are outside medicine and health science per se. Computational science and informatics are very important, as are social science, financial, business, and legal issues. When one looks at the parameters that predict health or disease, behavior and environment are two key contributors that in some cases are more important than biology. There's a lot of research going on at Emory in the behavioral and environmental sciences. There's also a significant subjective component to predictive health, which Emory, with its outstanding theology and pastoral programs, is in a strong position to address.

### What were the advantages to partnering with Georgia Tech on the Predictive Health Institute? How is the collaboration working out, and are we considering other partnerships?

Georgia Tech's significant strengths in the computing and engineering sciences are greatly helping our joint initiative to succeed. Georgia Tech Provost (and now interim president) Gary Schuster and I recently appointed a joint steering committee for the Predictive Health Institute, and from that group have formed a cabinet. We are focusing on next steps to move the initiative forward and are exploring programmatic areas beyond the Center for Health Discovery and Well-Being to identify our next area of focus. We also have formed a partnership with Ohio State University and are finalizing agreements with another university to complement this joint effort with Georgia Tech.

### In your remarks to medical school graduates on Commencement day, you cautioned them to ensure that medicine remains a profession, not a business. Why do you think this is important?

In the early twentieth century, as a direct result of the Flexner Report, medicine evolved from a trade based on skill to a profession based on knowledge. In some regards, it's now turning into a business based on revenue, margins, and market share. It's essential that we in the profession—and especially those just joining the profession—are committed to keeping it focused on knowledge and education. If we don't, the trends that are pushing medicine away from professionalism will dominate, and the benefits we provide to society will be diminished greatly. I believe our ability to successfully create a healthy society—through predictive health and other means—is dependent on knowledge creation, dissemination, and application as a measure of success, not how much money is made from providing care. ■

outcomes, there arise challenging ethical issues about who receives what treatment. Moreover, as we become more accurate in predicting outcomes, we raise more questions about what to do with people who refuse to comply with health maintenance and restoration. Who should pay for their care? For example, many ask why the rest of society should bear much of the increased health care costs for people who choose to smoke or not comply with treatment.

Decisions around risk-benefit of different interventions may become harder as better accuracy improves our ability to predict the probability of success versus the risk of complications.

For example, how should the health care team respond to a patient who prefers an intervention with a lower likelihood of success in order to avoid a more defined risk of complications, or conversely, when the patient chooses the most risky approach because of a low, but better-defined, possibility of return to health?

We will also need to take into account the behavioral norms of society and what people are comfortable doing with all the information to which they'll have access and may be asked to share.

### Do you think predictive health will become part of the mainstream