MAYO CLINIC

Mayo Magazine

VOLUME 23 NO. 1

WHY I GIVE
and the gift I was given

ALSO INSIDE:

Genomics and Parkinson's Disease

Building and Sharing Medical Knowledge

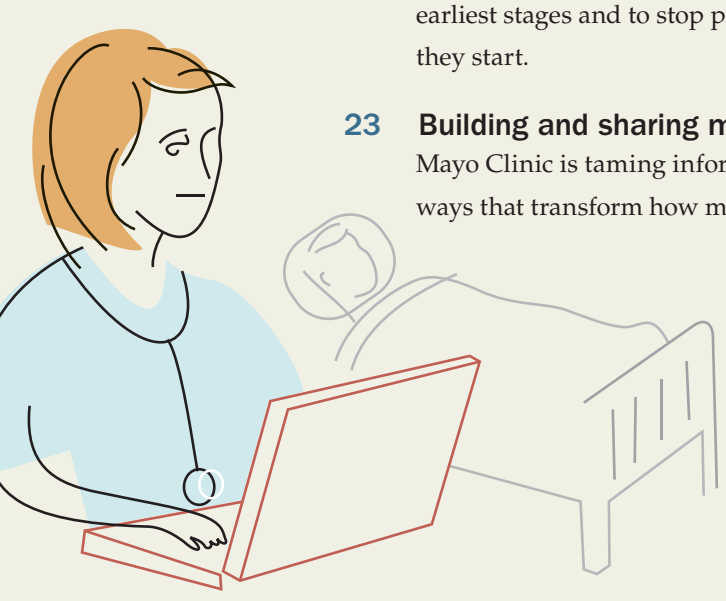
Secrets of the Heart

Mayo Magazine

VOLUME 23 NO. 1

page 2

page 14



page 23

FEATURES

On the cover

Bill Marriott, Jr., chair and CEO of Marriott International and chair of The Campaign for Mayo Clinic, his wife Donna and their daughter Debbie enjoy a day at the National Zoo in Washington, D.C., in 1960. To learn why the Marriotts have a special connection to Mayo Clinic, read the letter on page 1.

Dear Friends,

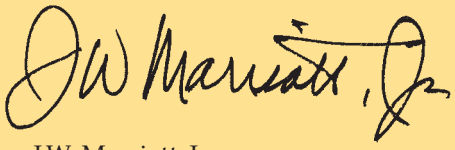
For the past four years, I have had the honor of chairing The Campaign for Mayo Clinic. It has been my pleasure to be connected with Mayo Clinic's continued commitment to serving patients through medical research, education and practice and to witness the generosity of Mayo Clinic's many benefactors.

We are now nearly halfway through the final year of the campaign. It would take volumes to describe the many ways in which the campaign has supported Mayo's work. I hope that you are inspired by the few examples collected here. They are testament to how medical education and discoveries are translated into improved health care. They show that the campaign is making a difference already — we can see and feel its impact.

Perhaps your family, like mine, has been touched by Mayo Clinic's healing hands. As patients, my wife Donna and I have had a long relationship with Mayo Clinic. And, in 1962, our daughter Debbie had life-saving cardiovascular surgery at Mayo Clinic when that procedure was a new venture in medical science.

Or perhaps your generosity stems from a desire to improve the health of future generations or to be part of an exciting journey of discovery. The difficult economic times this country is facing makes the campaign even more significant. With your support we will make a lasting impact. From understanding gene variations for better diagnosis and treatment to teaching Mayo techniques for performing lifesaving surgery, you can help as we reach out to the world and change lives.

Sincerely,



J.W. Marriott, Jr.
Chair, The Campaign for Mayo Clinic
Chairman and Chief Executive Officer
of Marriott International, Inc.

J.W. Marriott, Jr., and his daughter Debbie Harrison

Paths to discovery over time

Predicting Parkinson's disease

When archaeologists begin digging at the suspected site of an ancient city and find only a few pieces of pottery at the surface, they don't walk away dejected saying, "Well, we failed to find the city." They look carefully at the shards of clay and ask themselves, "Is there enough here that we should keep digging?"

Neurologist Demetrius Maraganore, M.D., recognizes the significance a few shards can have. Every day he and his team dig deep and sift through hundreds of thousands of genetic variations and genomic pathways in their quest to unravel the mysteries of Parkinson's disease. Dr. Maraganore is a Mayo Clinic professor of neurology and chair of the Movement Disorders Division. He also is the leader of the worldwide Genetic Epidemiology of Parkinson's Disease Consortium and of Mayo Clinic's Molecular Epidemiology of Parkinson's Disease study.

Demetrius Maraganore, M.D.

"Is there enough here that we should keep digging?"

— Demetrius Maraganore, M.D.

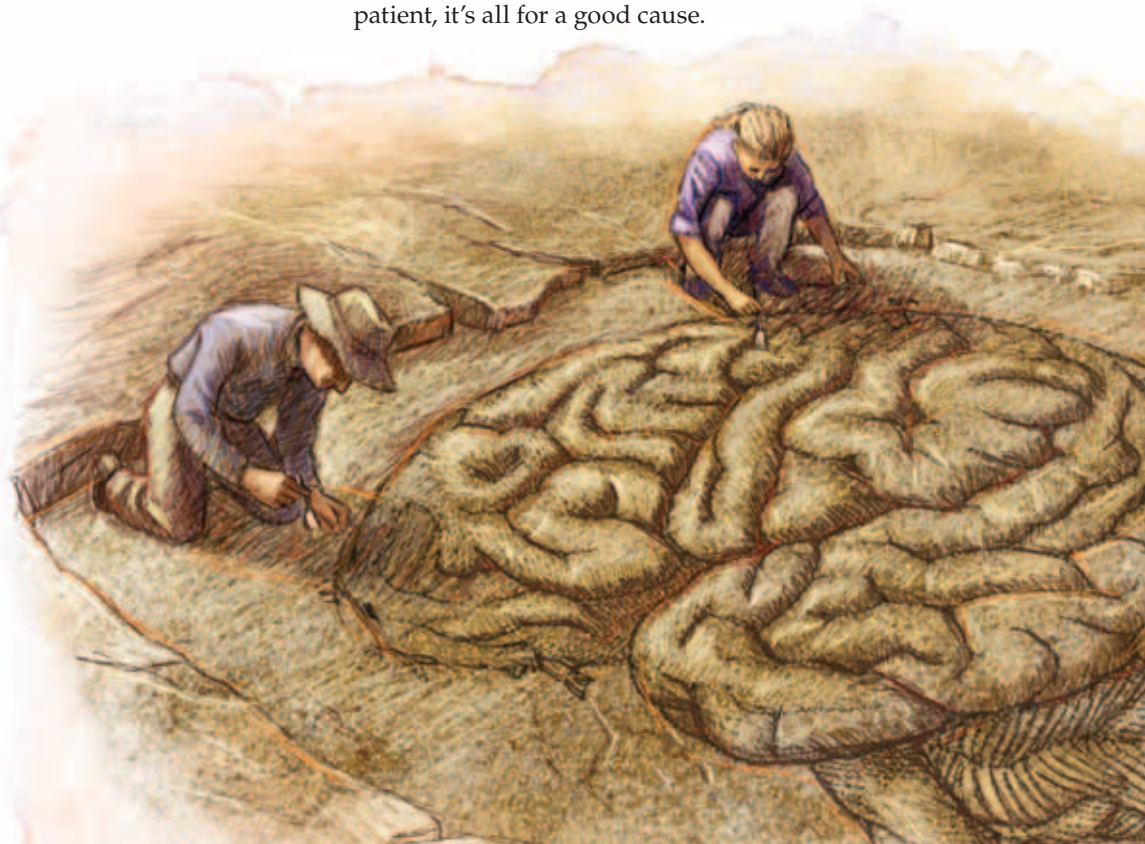

Matthew Farrer, Ph.D.

Excavating from complementary angles

Questions about Parkinson's disease and related disorders are complex and varied. They engage a host of high-level scientists in genetics, pathology and neurology, who each follow different approaches. One group of investigators is finding gene mutations that are unique to certain individuals, families, or special populations including Taiwanese, Ashkenazi Jews, and Tunisians. Matthew Farrer, Ph.D., director of the Division of Neurogenetics, began studying rare instances in which multiple family members had Parkinson's disease. He and his team concluded that Parkinson's disease in those families is caused largely by genetic mutations that pass through scores of related generations over hundreds, if not thousands, of years. Dr. Farrer's team started searching for mutations in genes that caused Parkinson's disease. You name it — they found it: alpha-synuclein, Parkin, SCA2, LRRK2, DCTN1 — a half dozen or more genes in the DNA code that had various "typographical" errors that caused Parkinson's disease in those families.

When Dr. Farrer's colleague, Zbigniew Wszolek, M.D., neurologist and director of Clinical Core of the Morris K. Udall Center of Excellence for Parkinson's Disease Research, began research on the genetics of Parkinson's disease and related conditions, most researchers thought the disease was caused by environmental factors. His experiences challenged that theory. In 1987, he examined a patient diagnosed with Parkinson's disease who reported that many family members suffered from a similar condition. This strong family history stimulated Dr. Wszolek's interest in genetics. He expanded the search through the patient's family tree to more than 300 members and traced the origin of the family to Colonial Virginia. Dr. Wszolek builds a pedigree from a small family and expands it by collecting blood and brain samples and other clinical materials. The goal is to deliver enough material to Dr. Farrer so he can find the gene.

In concert, Dr. Maraganore's team is looking at DNA variations across the entire genome (about 1 billion nucleic acid pairs and 30,000 genes) in thousands of Parkinson's disease cases and control samples from the melting pot of the United States while acquiring insight from the studies of Drs. Farrer and Wszolek that focus on rare families and isolated populations. These complementary approaches among colleagues inspire and stimulate collaboration. It's all about the patient, it's all for a good cause.



Sifting through degrees of mutations

Based on Drs. Farrer's and Wszolek's findings, Dr. Maraganore's team developed a simple hypothesis: If a major typographical error in a gene can cause Parkinson's disease in families, might more subtle errors in those genes render general populations vulnerable, too? The studies uncovered some clues that looked promising, but they didn't stand up to the rigors of replication, or they explained only a small fraction of the risk for Parkinson's disease in the general population. Dr. Maraganore's team decided to approach the problem differently.

Digging with molecular tools on a grander scale

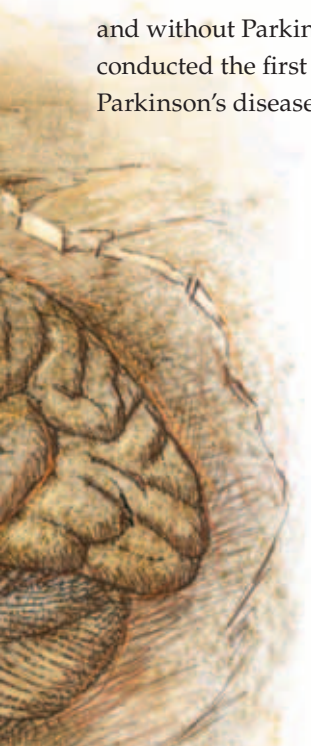
Fortuitously, the DNA microarray technology that became available in the early 2000s allowed Dr. Maraganore's team to measure hundreds of thousands of common genetic variations, called single nucleotide polymorphisms (SNPs), rapidly and affordably. In addition, the federal government and private entities provided billions of dollars to produce a database of human genome variation. This was called the Human Genome Project, which evolved into a broader partnership, the International HapMap Project. The result was a complete "parts list" that helps researchers find genes associated with human disease and their response to drugs. This technology, combined with these bioinformatics, allowed Mayo Clinic investigators to design studies to query hundreds of thousands of genetic variations in people with and without Parkinson's disease. Dr. Maraganore's team conducted the first genome-wide association study of Parkinson's disease — of any brain disease, for that matter.

Zbigniew Wszolek, M.D.

Although the study results were published in 2005, Dr. Maraganore explains, "Our method of analysis of the data was overly simplistic. We looked at about 200,000 genetic variations, and we divided our sample into two subsets. Our study highlighted a dozen 'SNPs,' simple typos in the DNA code that were associated with the risk of developing Parkinson's disease in subset 1, and in subset 2, and in both subsets combined. Only a dozen shards of broken clay! If we looked at the individual effects of any of those variants, they were small. Individually, the SNPs were not useful as methods to predict who would get Parkinson's disease, and they weren't good clues with respect to developing therapies to prevent Parkinson's disease. And, indeed, when other people tried to replicate our findings, they failed." Time to give up? Or to dig deeper?

Untangling wiring cues from "Cry of the Cat"

Research tends to follow a model of one step forward and two steps back. Researchers hope the steps forward are bigger than the two steps back. Fueled by their quest for answers, Dr. Maraganore and his statistician colleague, Tim Lesnick, looked at the 12 or so clues from their genome-wide association study and were most impressed by the findings for a gene called Semaphorin 5A, or SEMA5A. This gene belongs to a family of 128 genes that codes proteins responsible for orchestrating the brain's wiring during fetal development and for repairing that wiring throughout a person's lifetime.



Parkinson's disease is a progressive disorder that affects nerve cells in the part of the brain that controls muscle movement. Symptoms include tremor, slowed movement and rigid muscles. At least 1 million people in the United States are believed to have Parkinson's disease, and 2 percent of the population can expect to develop the disease during their lifetimes.

With each layer of excavation, Mayo Clinic researchers dig deeper into the complex genetic causes of brain diseases to assemble a more complete picture of their origins to help predict, prevent and halt progression.

They learned from the medical literature that a deletion of the SEMA5A gene causes a very rare, fatal genetic disorder called Cri du Chat or "Cry of the Cat" syndrome. This syndrome causes severe abnormality in how the brain is formed. Could it be that subtle variations not only in this SEMA5A gene but in other axon guidance pathway genes predispose people to Parkinson's disease?

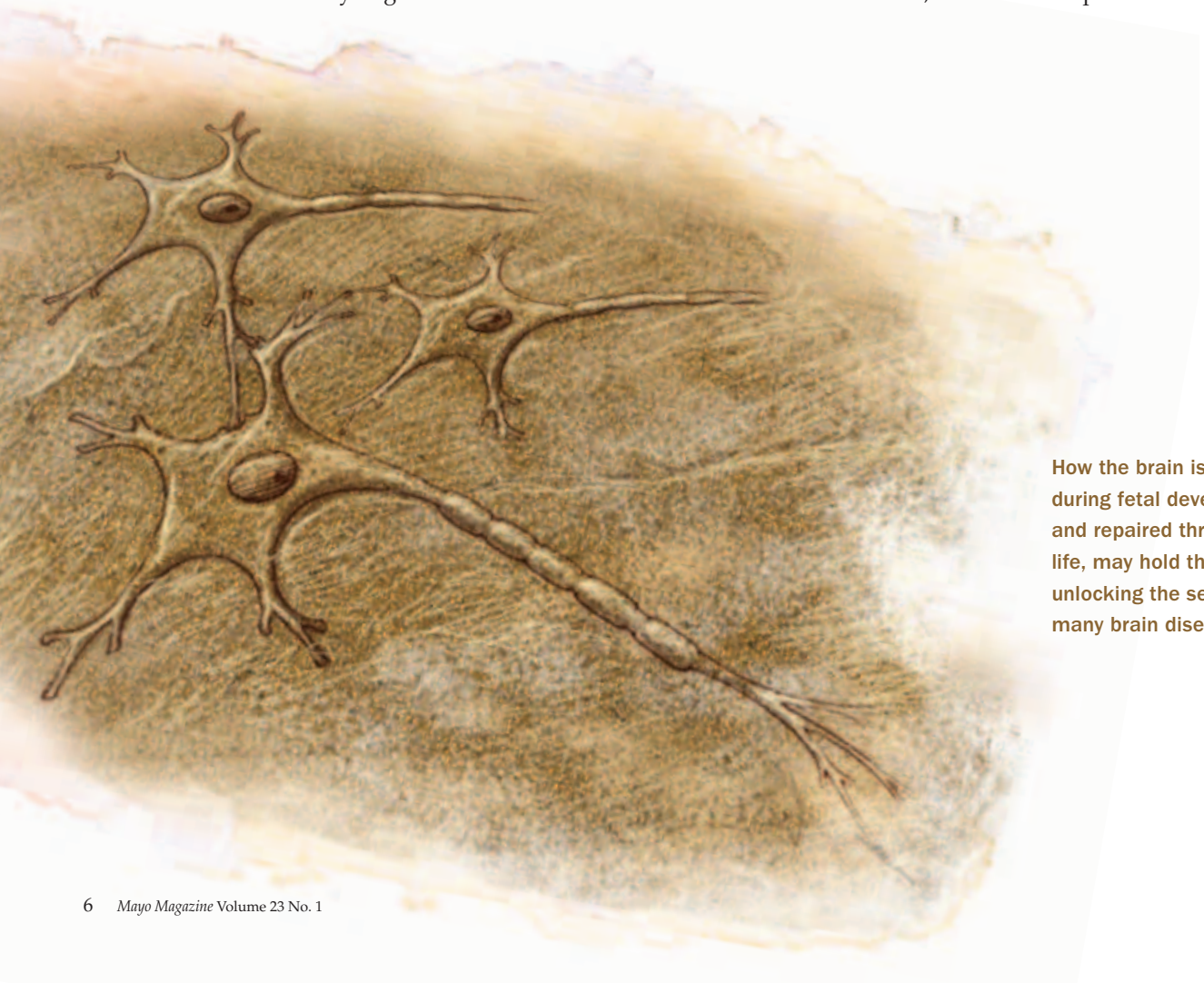
"In fact, our test was so good that we could correctly predict who was at risk, and who wasn't, better than 90 percent of the time."

— Demetrius Maraganore, M.D.

Taking a second look

Dr. Maraganore's team went back to their ill-fated whole-genome study of Parkinson's disease. But, this time they changed perspectives. Instead of looking at just 200,000 variables individually, they looked at the additive effects of variations within 128 genes. Do multiple variations within this axon-guided pathway predict Parkinson's disease?

The results astounded the researchers. "We found that common variations in these genes could identify people who were 90 times more likely to get Parkinson's disease than people who didn't have this profile — kind of like a DNA fingerprint," says Dr. Maraganore. "We found that we could identify, among people with Parkinson's disease, people who as a group had much higher risk and developed the disease as much as 20 years earlier than a group of patients who were considered to be at the lowest risk. And we found that we could predict with 86 percent accuracy the age at which you would actually develop Parkinson's disease. In fact, our test was so good that we could correctly predict who was at risk, and who wasn't, better than 90 percent of the time."



How the brain is wired during fetal development, and repaired throughout life, may hold the keys to unlocking the secrets of many brain diseases.

Ask a bigger question

Although a groundbreaking find, the results pointed to a bigger question. Could the researchers predict Parkinson's disease using axon-guided pathway gene variations in another sample? A year after Mayo's original genome-wide association study of Parkinson's disease was published, the data from a second study was published.

Dr. Maraganore's team took this dataset of several hundred thousand gene variations and asked which variations occur within the 128 axon-guidance pathway genes. The total was about 3,000. Could researchers identify a subset of those 3,000 or so variations that was again predictive of Parkinson's disease?

Yes! Dr. Maraganore's team demonstrated in two different samples of individuals that they could predict multiple Parkinson's disease outcomes by studying common variations in genes in a specific pathway. Other researchers have since used different statistical methods to perform pathway analyses within genome-wide datasets, but the axon guidance pathway is the only pathway that has been associated with Parkinson's disease in multiple datasets and by multiple investigators.

Finding patterns in wiring and repair for other neurological disorders

How the brain is wired and repaired surely isn't important just for Parkinson's disease. What about its importance for other neurological disorders? The Mayo team hypothesized that, just as common variations in axon-guidance pathway genes might predict Parkinson's disease outcomes, they might also predict Lou Gehrig's disease (ALS) outcomes. Lo and behold, by studying common variations in axon-guidance pathway genes in people with and without ALS, the scientists identified a DNA fingerprint, a subset of axon-guidance pathway gene variations that identified people who were 1,000 times more likely to get ALS. Similarly, the tests identified groups of individuals who developed the disease 25 years earlier on average than groups having lower risk.

Once again, the team could predict the age at which people developed ALS with 86 percent accuracy and could, with more than 90 percent accuracy, differentiate people with the disease from control subjects who did not have the disease.

Connecting pathways with diseases

Dr. Maraganore's group is refining its discoveries and extending the same approach to studying seven other diseases: ALS, Alzheimer's disease, stroke, attention deficit/hyperactivity disorder (ADHD), bipolar disorder, major depression and schizophrenia. This team is not looking at axon guidance alone, but at over 200 different pathways that have been annotated in humans, in search of DNA fingerprints that are just as predictive of those seven diseases.

With each layer of excavation, the Mayo team is assembling a more complete picture of the origin of brain diseases. By finding methods to predict these diseases, they create opportunities to prevent their onset or to develop treatments that target disease pathways and halt their progression. ■

Mayo Clinic is featured in the PBS Parkinson's documentary, "My Father, My Brother, and Me," available online at *www.pbs.org/wgbh/pages/frontline/parkinsons.*

How you can help: Contributions to The Campaign for Mayo Clinic help fund this and other areas of genomic research. For more information on how you can contribute, please visit The Campaign for Mayo Clinic Web site at *www.mayoclinic.org/campaign.*

Adam Jacob, M.D., and Hugh M. Smith, M.D., Ph.D., applied skills gained in simulation training to a critical real-life situation.

Saving a life

From rehearsal to reality

The Mayo Clinic Multidisciplinary Simulation Center provides hands-on practice using state-of-the-art medical technology.

It started as an ordinary morning in the operating room suite for Anesthesiology fellows Adam Jacob, M.D., and Hugh M. Smith, M.D., Ph.D. Their 83-year-old patient, a retired family physician from Iowa, was at Mayo Clinic being prepared for a total knee arthroplasty. He was awake and chatting with the staff as a pain block, or regional anesthesia, was being administered to control pain after surgery. Within a minute, everything changed.

The patient began to seize and then his heart stopped. Drs. Jacob and Smith immediately diagnosed the symptoms as local anesthetic toxicity, a highly rare and unusual complication. Whether by luck or by providence, the two anesthesiologists had recently completed simulation training using a scenario nearly identical to this case. They knew exactly what to do.

The team began cardiac life support measures. "I was squeezing in the first bag of lipid emulsion as quickly as I could get it in," says Dr. Jacob. They had rehearsed this therapy in the Mayo Clinic Multidisciplinary Simulation Center.

"The rehearsal also taught us how to direct the team, remain calm and know exactly who should be doing what. Knowing that is just as critical as knowing the type of drugs to administer," says Dr. Smith.

The quick, decisive response worked. Within 90 minutes, the patient was awake and responsive in the intensive care unit. And six weeks later, he returned for surgery. No complications.

"In our lifetime careers as anesthesiologists, we may only see one or two of these reactions," says Laurence Torsher, M.D., a consultant in the Mayo Clinic Department of Anesthesiology. "So simulation training is one way to give residents the opportunity to respond to rare, unpredictable and unusual complications such as this."

Improving patient safety and comfort

Simulated learning scenarios are designed to replicate realistic clinical situations. This includes the whole team — doctors, nurses, therapists and others. Each scenario is videotaped so that the entire team can review it together and gain insight into better ways to communicate with one another. This type of learning promotes better teamwork and builds confidence.

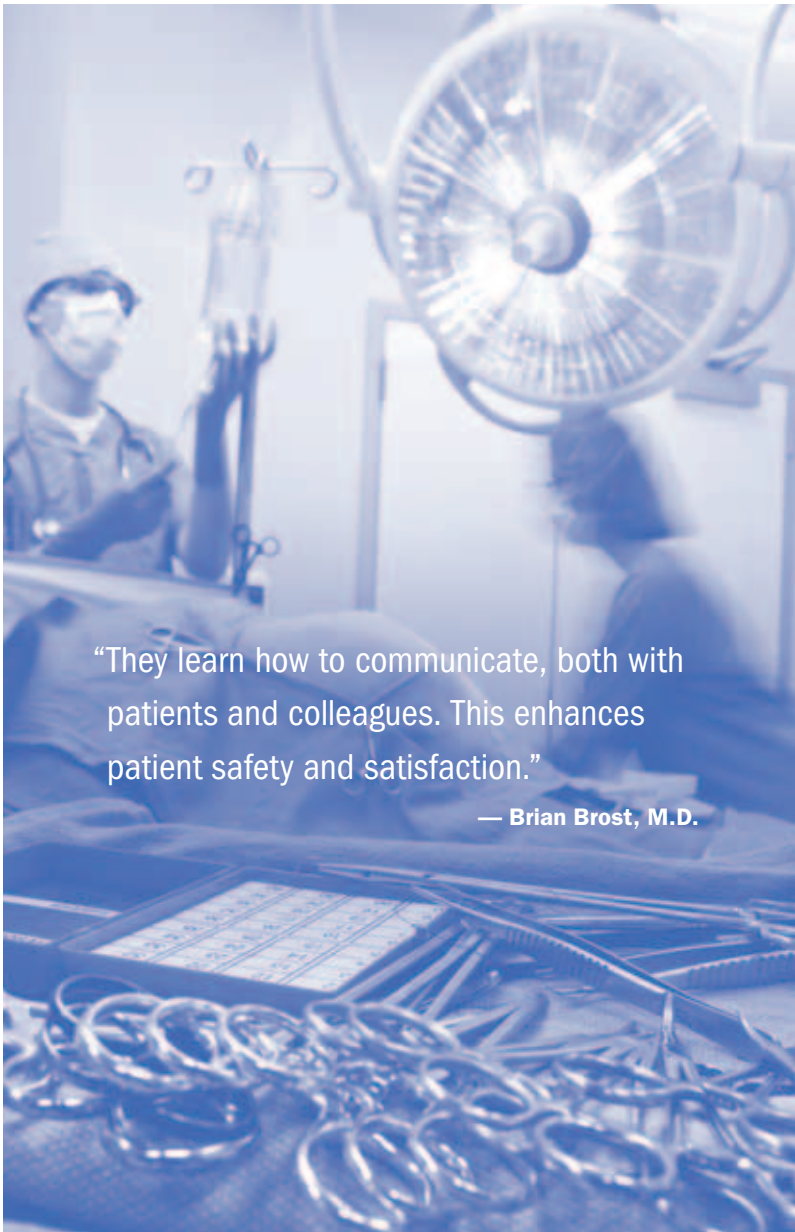
Simulation is rapidly becoming an essential element in the education of residents across Mayo Clinic specialties to improve patient safety and comfort. Similar to the anesthesia residency program, many specialty areas use simulation to prepare residents to manage rare emergencies as well as to hone basic clinical skills.

For example, in 2007, the Obstetrics & Gynecology (OB/GYN) Program launched a two-week PRIMER training program. PRIMER is an acronym for Procedural-centered Repetition Involving Montessori type Experience and Rehearsal. The program allows OB/GYN and Family Medicine interns to learn and practice essential clinical and procedural skills on task trainers (models) and high-technology mannequins.

The goal of training is skill mastery through focused repetition in a nonclinical environment. Interns practice communication and history taking skills, cervical examinations in pregnancy, episiotomy repair, circumcision, pelvic examinations, and surgical skills, all within a simulated, realistic environment. Each intern's progress is evaluated throughout the course. At the end of training, interns self-evaluate their sense of confidence and competency.

The OB/GYN Residency Review Committee of the Accreditation Council for Graduate Medical Education has commended Mayo's Department of Obstetrics & Gynecology for the PRIMER program. The committee praised the department for innovative and creative efforts at enhancing resident education that will lead to shorter procedural times and enhanced patient safety.

In 2008, the Mayo Clinic Multidisciplinary Simulation Center offered 90 new courses, for a total of over 600 classes since the center opened. More than 5,500 learning encounters have occurred there.



"The value to our patients is the foremost reason why Mayo must continue to strengthen its academic education program."

— William Dunn, M.D.

"They learn how to communicate, both with patients and colleagues. This enhances patient safety and satisfaction," says Brian Brost, M.D., a Mayo consultant and associate professor of Obstetrics-Gynecology. The program can be used by interns, residents and fellows from different specialties to perform core procedures at or beyond the level of learners trained using traditional medical educational methods.

Changing the future of medical education

Because today's health care providers are expected to learn more in less time, the Mayo Clinic Multidisciplinary Simulation Center has dramatically changed medical education.

"The value to our patients is the foremost reason why Mayo must continue to strengthen its academic education program," says William Dunn, M.D., a consultant in pulmonary and critical care at Mayo and the simulation center's director.

Simulation-based education is at a pivotal point in its development. Its potential to improve patient care and safety throughout all medical specialties needs further exploration. As more specialties use the facility, the hours of service and staff needs continue to grow, and the demand for operating support increases. Mayo Clinic has the institutional commitment, leadership, expertise and multidisciplinary collaborations to lead the nation in developing simulation learning to its full potential. This promises to profoundly benefit all of medicine. Continued support will help Mayo fulfill this vital mission. ■

The Multidisciplinary Simulation Center is one of many initiatives you are invited to support through The Campaign for Mayo Clinic. To see them all, go to *www.mayoclinic.org/campaign* and click on Miracles Within Reach on the left navigation bar.

Paul Andrews, M.D.

Director, Mayo Clinic Multidisciplinary Simulation Center, Arizona

When sharing his vision for simulation in medicine, Paul Andrews, M.D., medical director, Mayo Clinic Multidisciplinary Simulation Center in Arizona, leans forward in his chair as though he is leaning toward the future. To emphasize a point, he reaches for a journal article on simulation from a stack of academic publications.

A urological surgeon, Dr. Andrews embraced minimally invasive technology in its infancy. He mentored colleagues as they applied the new technology to patient care. Dr. Andrews believes simulation education can have the same transformational impact on medicine that minimally invasive surgical techniques have had.

Mayo Magazine *recently talked with Dr. Andrews about simulation education and the new simulation center scheduled to open in Arizona in November 2009.*

What exactly is simulation education?

The first thing that you learn when you start to understand simulation is that it's really not a technology; it's a technique in which we take real experiences and amplify them. We guide people through medical situations in an immersive way that evokes or replicates the real world in a fully interactive fashion.

What is Mayo Clinic's vision for simulation education?

This is a platform for education, to develop high-performance teams who are prepared to respond to the unexpected and the routine. As we develop these high-performance teams, we emphasize patient safety, improved quality and outcomes, service and value.

How will Mayo Clinic's simulation education program in Arizona be different from other institutions?

I think one of the differences is that we're going to have our simulation center on site, in the hospital. It's going to allow us to train teams and individuals routinely, without people having to travel long distances. Another difference is that we're a multidisciplinary group, and it's going to provide us an easier avenue to train teams of people.

What do you see as the future of simulation medical education?

I predict it will become a standard in education. It will be required by professional societies, specialty boards and accreditation agencies. It will be considered criteria for base competency measures to ensure caregivers have the necessary skills and the knowledge.

Why is working with simulation so invigorating for you?

As a clinician, I get to help a lot of individuals in a very special way, in a way that I'm honored to do. The rewards are very significant, especially when you see patients recover after caring for them. Working with simulation is rewarding in the sense that I get to add value in a different way, in a much broader way. I get to add value to the institution, to the educational aspects of our institution in training nurses, residents, paramedical people and teams. I think the end result will improve our culture of quality and safety. Playing a small role in that is going to be something that I value long term in addition to taking care of the individual patient.

What is the most important thing that you've learned as director?

I've learned that in getting our simulation center off the ground — all aspects of it, whether it's raising the money for it or deciding what the space is going to look like — it's team, team, team. And I have a lot of partners in this. I have partners in Education, including Dr. Joseph Sirven, Sheila Collins, Tamara Kary … without them this would not be successful. Teamwork with people in Nursing has been very important. I've learned that it's important to have someone at the top who has bought into this and supports you. And that's Dr. Victor Trastek [CEO, Mayo Clinic Arizona]. The fact that he puts this as a priority has made my job and that of the people I work with, the team that I work with, much easier.

Has anything surprised you about the project?

The cost of it. This is not an endeavor that is done without significant cost and significant help from our benefactors. Another thing that I've been surprised by is the scope of simulation and how broad it is in medical education. This is something that is very similar to what they're doing in the airline industry. The airline industry spends a lot of money each year utilizing simulation to improve safety for their employees and passengers.

Do you feel it will ultimately improve medicine as a whole?

Definitely. This is going to enhance the care of patients; it's going to decrease the number of medical errors. I see it also as a way to establish benchmarks and criteria for competency-based performance.

Is there any current ongoing research or future planned research for simulation education?

Yes. Over time this is going to be a tool by which we learn how teams function best. This is going to be a tool in which we figure out how to form teams — what is the best environment to put these teams in and what size the teams should be. It's going to teach us what the important human factors are in terms of how people relate with one another.

This is also going to be a research tool that we'll be able to use any time we have an important event in the hospital, to go back and recreate it and see what was done right and what was done wrong.

It's going to be a tool when we start a new program — let's say we're starting a new heart transplant program or a kidney transplant program — and we're going to be doing a new procedure. We'll take it to the simulation center first to see how we function in that environment before we take care of a patient.

What is the status of the simulation center in Arizona?

Currently, the simulation center in Arizona is under construction. The plan is to have the simulation center operating in the fall. Support from benefactors is making it possible. ■

Far away, but close to home

Can new treatments and delivery models counter the effects of stroke?

Thousands of miles and nearly a decade separate Aurora Sandoval's and Michael Hanley's experiences with stroke. Despite the chasm, they are companions in America's — and Mayo Clinic's — efforts to improve the treatment of ischemic strokes.

By far the most common type of stroke, ischemic stroke occurs when a blood vessel in the brain becomes blocked. Ischemic strokes are a leading cause of disability and are responsible for about 90 percent of the 770,000 new or recurrent strokes that occur each year, according to the American Heart Association (AHA).

Since 1996, physicians have had a tool that significantly reduces the devastation caused by ischemic strokes if it's administered during the first three hours of a stroke's onset. It's a medicine called tissue plasminogen activator, or tPA. This treatment — and the difficulty physicians have giving it more widely — connects Mrs. Sandoval's and Mr. Hanley's stories.

In Mr. Hanley's case, tPA is part of the "what ifs" that come up when he thinks about his parents' experiences with stroke. His father and mother had strokes in the mid-1990s, and both were left with devastating aftereffects.

"It took away the things that both of them were known for best," says Mr. Hanley, a Mayo Clinic benefactor who owned a publishing company in Washington, D.C. "In my dad's case, he was a big, strong guy, and his stroke took away his ability to walk and be independent. In my mom's case, she was a great conversationalist, and the stroke took away her ability to talk. Three big 'ifs': If tPA had been known, if we could have gotten to the hospital in time, and if they both would have qualified for the drug, what a difference it would have made in their remaining years."

Mrs. Sandoval stands on the other side of that 'what if.' She had a stroke in the middle of her family's Thanksgiving celebration last year. She lives nearly 190 miles from Phoenix, but thanks to a new program in Arizona, physicians at her local hospital consulted with a Mayo Clinic stroke physician in his home office, and she received tPA.

"I would never have received the shot that saved my life without this program," says Mrs. Sandoval, who has recovered completely.

Despite her positive outcome, questions remain. Will she still be an anomaly in the years to come? Only 5 to 10 percent of all stroke patients currently receive tPA, according to AHA. And, despite its benefits, tPA is

Michael Hanley, whose parents Myron and Jane Hanley are pictured here, was inspired to support stroke research because both his parents experienced ischemic strokes.

Mayo Clinic neurologist Bart Demaerschalk, M.D., can confer with stroke patients from his home office through the Stroke Telemedicine for Arizona Rural Residents program.

not a panacea. Many patients can't receive it because of contraindications with other medicines they take. So can anything more be done? The jury is still out, but exciting possibilities are coming from Mayo Clinic, possibilities that tie intimately to Mr. Hanley's and Mrs. Sandoval's stories.

Thanking her lucky S.T.A.R.R.

One minute Mrs. Sandoval was enjoying her Thanksgiving dinner in Kingman, Ariz. Then, the left side of her body became numb, and she vaguely remembers her daughter dialing 9-1-1. She was rushed to Kingman Medical Center. Her next memory is seeing Mayo Clinic neurologist Bart Demaerschalk, M.D., not in person — but on a monitor screen.

Just moments before, Dr. Demaerschalk also was enjoying a family Thanksgiving. Suddenly, his pager alerted him of a stroke emergency at one of the regional hospitals Mayo Clinic serves through a recently launched telemedicine program called Stroke Telemedicine for Arizona Rural Residents, or S.T.A.R.R.

Dr. Demaerschalk walked quickly from his dining room to his home office and, within a few minutes, was talking with Mrs. Sandoral and evaluating her symptoms and CT scan using an audiovisual internet-based system. "He was asking me questions and interacting with me as if he were in the room with me," says Mrs. Sandoval. Dr. Demaerschalk diagnosed an ischemic stroke and recommended the use of tPA. Staff at Kingman Medical Center administered the drug.

Launched in 2007, S.T.A.R.R. is one way Mayo Clinic physicians are broadening the use of tPA and responding better to its three-hour window of opportunity. The program recognizes the significant hurdle that a 180-minute countdown poses for people in rural areas who lack immediate access to a stroke center and its specialists.

Dr. Demaerschalk and Bentley Bobrow, M.D., a Mayo Clinic emergency medicine physician, are the co-directors who developed S.T.A.R.R. in collaboration with the University of California San Diego and the Arizona Department of Health Services. Terri Kiernan, a nurse practitioner, manages the program. The on-call duties are shared by four vascular neurologists, Dr. Demaerschalk, Timothy Ingall, M.D., Ph.D., Maria Aguilar, M.D., and David Dodick, M.D. Thus far, the program serves four community hospitals in Arizona: Kingman Regional Medical Center, Yuma Regional Medical Center, Copper Queen Community Hospital in Bisbee, and La Paz Hospital in Parker.

The program uses a "hub and spoke" model, with Mayo Clinic serving as the hub, providing access to its staff of vascular neurologists over the Internet. These on-call Mayo Clinic specialists can access S.T.A.R.R.'s stroke telemedicine system through any Internet connection.

The community hospitals access Mayo Clinic through STRokE DOC, a remote-site, audio video consultation unit with a monitor and viewing software that displays images of the consulting physician and the patient. The consulting

physician can pan, tilt and zoom the camera remotely. Patient and physician communicate through a microphone and speaker system.

"The physician can engage patients and emergency personnel as if they were right there in the room with them," says Dr. Demaerschalk. "My experience has been that patients are as attentive and responsive to the STRokE DOC as they would be to me if I were in the room."

Research shows that systems like S.T.A.R.R. are effective. For example, studies conducted by Mayo Clinic and University of California San Diego found that tPA use in rural locations increased when telemedicine allowed access to a vascular neurologist. Utilization of tPA increased to 25 to 30 percent of acute stroke patients in the population from 5 percent. Moreover, the STRokE DOC trial revealed that 98 percent of stroke patients who were assessed with the audio visual telemedicine examination received accurate emergency decision making. That compares with 82 percent accuracy for telephone-only neurological assessments.

Mrs. Sandoval is living proof that stroke telemedicine is effective. "I praise God that Dr. Demaerschalk was available through this program," she says. "He was like an angel sent from heaven to take care of me."

Beyond tPA?

In Mr. Hanley's case, pondering the "what ifs" of his parents' strokes led to a "what more?"

With a gift from Mr. Hanley for stroke research at Mayo Clinic, investigators have launched a phase II clinical study testing donepezil, the most widely prescribed drug for Alzheimer's disease, as a therapy to enhance recovery following an ischemic stroke.

The Mayo Acute Stroke Trial for Enhancing Recovery, or MASTER, is the first of its kind at Mayo Clinic and among the first anywhere to test a drug therapy for enhancing stroke recovery. If the Mayo Clinic team can prove the drug is beneficial, MASTER will advance stroke care in two important ways. Physicians will have a new treatment option in the early phase of stroke recovery that also will enhance the benefit of rehabilitation programs, the primary tool used to help patients recover from stroke.

Aurora Sandoval enjoys life at home in Kingman, Ariz., with her husband Henry and her dogs. Mrs. Sandoval was successfully treated for a stroke in November through telemedicine.

"We're asking a straightforward but important question: If we boost memory, learning and other areas of cognition, will we improve outcomes?"

— James Meschia, M.D.

The researchers believe donepezil may help stroke patients during rehabilitation because the drug improves memory, attention span and other cognitive functions by slowing the breakdown of a chemical in the brain called acetylcholine, which is important to these functions.

"We're asking a straightforward but important question: If we boost memory, learning and other areas of cognition, will we improve outcomes?" says James Meschia, M.D., a Mayo Clinic neurologist and the lead investigator in MASTER.

Clues to the drug's effectiveness should come quickly. Nearly 90 percent of gains that patients make from rehabilitation occur during the first 90 days following a stroke.

MASTER is designed around this time frame. Its goal is to recruit about 40 patients, each within the first 24 hours of a stroke. Every participant will go through a standard rehabilitation program and will take donepezil daily for the first 90 days, then go off the drug.

Though MASTER is a therapy for the recovery phase of stroke and not the treatment phase that tPA addresses, it is a response, in part, to the limitations of tPA use. According to Dr. Meschia, "tPA has a variety of exclusionary criteria that prevent it from being widely used in stroke patients. For example, you cannot give tPA to a patient on blood thinners, and that's not uncommon in the stroke patient population. So, while we need to find ways to give tPA more effectively, we also need therapies for later phases of stroke recovery."

What does benefactor Michael Hanley think of this possibility? He says the reason he got involved with medical research was to help researchers develop therapies. He doesn't believe that one study — or even one gift — can revolutionize stroke treatment. But he can help push medicine incrementally forward to benefit patients in the future.

"We have the infrastructure in place to quickly address relevant clinical questions," says James Meschia, M.D., pictured above with research coordinator Alexa Richie. "That makes us an especially good investment for benefactors."

"I don't know if one gift can create a medical breakthrough or if it's even possible to accurately measure the impact of one gift in a medical breakthrough," Mr. Hanley says. "But I do hope that my gift helps create something that prevents or helps other people avoid the experiences my family has had with stroke." ■

For information on how to contribute to The Campaign for Mayo Clinic, visit the Web site at *www.mayoclinic.org/campaign*.

Discovering secrets of the heart

Mayo Clinic is committed to decreasing the incidence of cardiovascular disease

Who's at high risk for heart disease? This question may not seem too difficult to answer. Conventional wisdom says the overweight, middle-age, inactive, male smoker will have heart problems. The reality is a bit different.

"Although certain factors can put you at higher risk, without some investigation no one can say they aren't vulnerable to cardiovascular problems," says Amir Lerman, M.D., director of research for Mayo Clinic's Cardiac Catheterization Laboratory. "Fifty percent of people who die of heart attacks die without warning or traditional signs or symptoms."

In response, physician-researchers at Mayo Clinic are employing advanced technologies to detect cardiovascular disease at its earliest stages and prevent problems before they start.

Finding clues through blood testing

Once classic symptoms of heart failure appear — such as fatigue, fluid retention, shortness of breath or chest pain — considerable damage has already occurred. John Burnett, M.D., a physician in Cardiovascular Diseases and Internal Medicine, says therapy for people at risk for cardiovascular disease — to anticipate and counteract potential problems — must begin long before the onset of symptoms.

"Although certain factors can put you at higher risk, without some investigation no one can say they aren't vulnerable to cardiovascular problems. Fifty percent of people who die of heart attacks die without warning or traditional signs or symptoms."

— Amir Lerman, M.D.

"Mayo is developing novel blood tests and imaging techniques that will help us predict who's going to have cardiovascular disease."

— John Burnett, M.D.

"By the time a person experiences symptoms, it's difficult to reverse the damage," says Dr. Burnett. "Instead of waiting until that point, Mayo is developing novel blood tests and imaging techniques that will help us predict who's going to have cardiovascular disease."

One promising approach for early identification of high-risk individuals that Dr. Burnett and colleagues are exploring is testing blood for a substance known as B-type natriuretic peptide (BNP), produced by the heart. Physicians know that BNP levels in the blood rise as heart failure progresses. But a 2007 Mayo Clinic study revealed that even moderately elevated levels of BNP in people who have no symptoms are associated with an increased risk of death. Other studies have supported the ramifications of an elevated BNP in predicting heart failure, stroke, atrial fibrillation and other cardiovascular diseases.

"Rising BNP levels can be a response to slight changes and damage in the heart that happen long before we would be able to detect any abnormalities with standard imaging," says Dr. Burnett. "An elevated BNP is the red flag that something's happening."

Exploring evidence in the vessels

It's not only blood that provides clues to a person's cardiovascular future. Blood vessels also offer subtle hints. To obtain evidence from vessels, Dr. Lerman and his colleagues in the Cardiac Catheterization Laboratory are using a simple, non-invasive imaging technique.

During the test, a probe is placed on a patient's finger, then a blood pressure cuff on the arm is inflated for five minutes. Measurement of blood flow in the finger indicates blood vessel function and health. An abnormal response may signify early atherosclerosis and a risk for cardiovascular events.

"If we see results that indicate there may be a problem, we discuss them with the patient and talk about lifestyle modification, treatment and follow-up, as appropriate," says Dr. Lerman. "All this is done in the latent stage, before any signs or symptoms appear. We don't want to let it go until the first manifestation is a heart attack or heart failure."

When high risk for cardiovascular disease is identified in patients, additional blood vessel imaging can help monitor their condition. For example, physicians can thread a tiny ultrasound device into a person's blood vessels to examine and assess fat (plaque) buildup in arteries.

"The majority of heart attacks occur when plaque buildup is not significant enough to block the artery; instead the plaque just erupts," says Dr. Lerman. "With this sophisticated imaging, we can actually examine the content of the plaque to see if it's dangerous and identify which plaque is at risk for erupting."

Understanding what the heart tells

The heart also can reveal evidence of potential cardiac problems. To uncover that evidence, Mayo Clinic researchers are scrutinizing the intricate functioning of a healthy heart.

"The nature of our research is to develop state-of-the-art ultrasound techniques for understanding how the heart works," says Marek Belohlavek, M.D., Ph.D., a Mayo physician-researcher in Cardiovascular Diseases. "It sounds like something that should have been described centuries ago. But only recently, with the advent of new ultrasound technology and novel research approaches, are we starting to understand how blood actually flows through the cardiac chambers."

Dr. Belohlavek, Partho Sengupta, M.B.B.S., a physician-researcher in Cardiovascular Diseases and recipient of Mayo Brothers' Distinguished Fellowship Award for 2009–2010, and others are examining the complex blood flow patterns — the small jets, swirls and vortexes — that occur as blood flows through the heart. "By studying the patterns of blood flow, researchers have now discovered that the heart's action is not a simple squeeze but entails a wringing motion that is primarily designed for energizing the swirling motions of blood flow," says Dr. Sengupta.

"We are trying to see how these tiny blood flow patterns change in the early phase of disease," says Dr. Belohlavek. "It's our hypothesis that the general cardiac function may not be affected — the heart still pumps the blood adequately. But there may be small alterations in the heart's overall efficiency."

"The nature of our research is to develop state-of-the-art ultrasound techniques for understanding how the heart works. "

— Marek Belohlavek, M.D., Ph.D.

Marek Belohlavek, M.D., Ph.D., (left) and Partho Sengupta, M.B.B.S., (right) and others are examining the complex blood flow patterns — the small jets, swirls and vortexes — that occur as blood flows through the heart.

To see complex blood flow, the researchers use sophisticated echocardiography that involves a technique called digital particle imaging velocimetry. Tiny gas bubbles are injected into blood flowing inside the heart. As they move, the bubbles are monitored with sound waves. A computer records each bubble's movement and the resulting image shows the collective flow of bubbles within the heart.

Armed with this understanding of the minute details of blood flow and the changes that occur when abnormalities are present, these Mayo Clinic researchers are working to translate their findings into methods for detecting diseases in their earliest stages. Those diseases include hypertension, ischemia and other cardiovascular disorders that affect the efficiency of heart function.

Focusing on cardiovascular health

By examining the issue from a variety of angles, Mayo Clinic is creating a comprehensive approach to cardiovascular prevention and early detection. For example, an inexpensive blood test for BNP may reveal a need for more sophisticated monitoring in one patient. Another patient might benefit from a brief, noninvasive test to assess vascular health that may trigger a closer look inside the blood vessels. Meticulous research into the nature of how the human heart works may lead to advances in early detection of cardiovascular diseases.

"Our focus is on cardiovascular health, not cardiovascular disease," says Dr. Burnett. "Mayo Clinic is particularly well-suited to lead this effort because, not only do we have the knowledge, advanced technology and pioneering research to understand how to detect possible problems, we also have a team of experts that works together to help patients make sense of the information they receive and understand what they can do to stay healthy."

The Campaign for Mayo Clinic supports research to improve heart disease prediction and treatment to reduce death from heart problems.

"By studying the patterns of blood flow, researchers have now discovered that the heart's action is not a simple squeeze but entails a wringing motion that is primarily designed for energizing the swirling motions of blood flow."

— Partho Sengupta, M.B.B.S.

The turning point: a patient's story

Ellin Wentzell, who was diagnosed with a cardiovascular disorder during a clinical study 16 years ago, teaches reading in Willmar, Minn.

In 1992, when she was 44, Ellin Wentzell ignored occasional chest pain. She knew her family history of heart disease wasn't good. On her father's side, five men had died of heart attacks before age 60. But, as a young, active mother of three, she wasn't worried.

Then, Mrs. Wentzell's 43-year-old brother had a heart attack. At a doctor's urging, she had an electrocardiogram (EKG). The results were abnormal. Results of a stress test also were cause for concern. But a cardiac angiogram to examine her heart's blood vessels showed her arteries were clear.

"No one could figure out what was wrong with me," says Mrs. Wentzell. "One doctor told me I couldn't be having heart problems because I was a woman. But I knew something was happening."

Chest pain became a daily occurrence. She was scared to go out alone. Her doctors tried a variety of medications, and she required several hospitalizations. Mrs. Wentzell dealt with the mystery of her chest pain for five years. Then, a family member, a physician, learned of a study under way at Mayo Clinic regarding a cardiovascular disorder called endothelial dysfunction. He recommended Mayo and the study to Mrs. Wentzell. That was the turning point.

Researchers now know that women are more prone to endothelial dysfunction. The condition occurs because the arterial lining doesn't allow the expansion necessary to boost blood flow during activity, increasing the risk of coronary artery spasm and sudden death. Mrs. Wentzell enrolled in the clinical trial and was almost immediately diagnosed with the disorder. Endothelial dysfunction was the source of her chest pain.

Treatment with medication and ongoing follow-up with her Mayo Clinic physicians, as well as doctors in her hometown of Willmar, Minn., have kept her condition under control for 16 years. Now, at age 60, Mrs. Wentzell continues to enjoy her teaching career as a reading specialist and has had no additional heart problems.

"Being part of the study at Mayo made all the difference," says Mrs. Wentzell. "Without that research, I wouldn't have known what was wrong, and I couldn't have prevented something major from happening. I hope what the doctors learned, and what they continue to find with their heart research, will help others the way it helped me." ■

Building and sharing medical knowledge

Enterprise Learning System connects people, ideas and processes

"These hallways were once filled with racks of medical journals," muses Farrell Lloyd, M.D., co-director of the Enterprise Learning System, as he walks through Mayo Clinic's Plummer Library. "While many of the racks are now gone, the information you can get here is greater than ever before."

The breadth of medical information is staggering: 1,500 journal articles and 55 clinical trials are published daily. So, why does the medical library of a world-renowned medical institution have empty shelves? The answer is simple: The mode in which information is acquired has changed significantly. It's often with the click of a mouse rather than the turn of the page.

Farrell Lloyd, M.D.

"Medical students and physicians are bombarded with more information than ever before. The real challenge is getting to the gist of the information rather than reviewing information verbatim."

— Farrell Lloyd, M.D.

"There's no doubt that at the beginning of my career, many physicians functioned on their ability to memorize important information," says Steve Ommen, M.D., medical director for AskMayoExpert. "More and more, physicians are relying on their knowledge of where to find information."

Drs. Lloyd and Ommen have pivotal roles in the development of the Enterprise Learning System (ELS), a knowledge management tool that provides information when and where physicians need it most — at the point of patient care.

The challenge

The problem can be summed up in two words: information overload. New discoveries and methods for delivering patient care are happening so quickly that it's virtually impossible for care providers to learn and incorporate all the data that comes across their desks. In fact, less than 1 percent of new information is applied to a physician's daily routine.

"Medical students and physicians are bombarded with more information than ever before," says Dr. Lloyd. "The real challenge is getting to the gist of the information rather than reviewing information verbatim."

That's not the only obstacle. As Mayo's medical staff has expanded to more than 3,300 physicians, doctors are challenged more than ever just to know which specialist to contact for advice specific to their patient.

"When I started here and had a question, I knew the one or two best people to contact on an issue," says Dr. Ommen. "But as the Mayo Clinic staff has grown, you don't always know who the best contact is."

The solution

"ELS is a cognitive prosthetic," says Dr. Lloyd.

Prosthetics support, connect and assist with everyday functions, but there's no one-size-fits-all solution. ELS is a Mayo-designed, online software system that, when fully developed, will facilitate learning and increase efficiencies in patient care. Early detection and notification of patient conditions will speed the pace of care. And learning tools will guide physicians to experts on specific conditions and Mayo-vetted clinical information. Additionally, online self-assessment questions will be available for physicians to

evaluate their understanding of a topic and provide ongoing Continuing Medical Education (CME) credits.

The best characteristic: ELS can be accessed anywhere, anytime, with just a simple click of a mouse.

ELS in action: ELS is slated to be completely developed and fully integrated into Mayo Clinic practices by 2010. Currently, the Department of Internal Medicine components are being piloted in the clinical practice. This Mayo-developed technology is already saving lives. Here's a scenario of how the system works to notify, inform and teach Mayo's care providers.

ELS Detection and Notification: A physician is making rounds at Saint Marys Hospital when she receives an alert. Her patient had been diagnosed with a potentially devastating condition — new onset atrial fibrillation. This diagnosis isn't made through examinations with a stethoscope or medical imaging, but rather through automatic data analysis based on the patient's electronic medical record. She is witnessing ELS Detection and Notification in action.

ELS Detection and Notification is the tool that uses rules to analyze data from a patient's electronic medical record. When semi-urgent medical conditions are identified, physicians are alerted with the diagnosis.

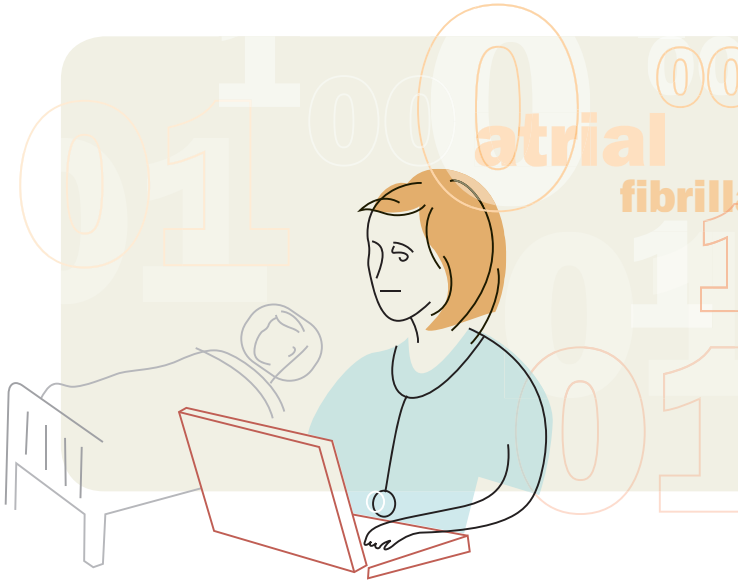
The alerts are accompanied by information uniquely tailored to the patient's condition and suggest next steps for the physician to consider.

"If you had a dangerous find on your EKG, would you want to learn about it two weeks from now or right when that disease is diagnosed?" asks Dr. Ommen. With ELS Detection and Notification, the waiting can be minimized and the patient can receive care more efficiently.

Steve Ommen, M.D.

"When I started here and had a question, I knew the one or two best people to contact on an issue. But as the Mayo Clinic staff has grown, you don't always know who the best contact is."

— Steve Ommen, M.D.



AskMayoExpert: After the physician receives the alert, she rushes to the patient's room, greets the patient and logs onto AskMayoExpert. The Frequently Asked Questions section suggests action steps: If new onset atrial fibrillation exists, cardioversion may be necessary for some patients. AskMayoExpert also lists cardiologists with expertise on this condition. The physician calls one of these cardiologists to schedule the recommended procedure. She then prints off patient education materials regarding the condition and shares this valuable information about the diagnosis with the patient.

AskMayoExpert is the ELS component that provides information to physicians when they need it most — at the point of patient care. Organized by medical specialties and conditions, AskMayoExpert lists internal expert contact information to accelerate dialogue between caregivers.

"One thing that's unique about Mayo is that physicians here have never been shy about contacting a colleague for their advice," says Dr. Ommen. "This tool further encourages that collaboration."

AskMayoExpert also provides gist-based information regarding specific conditions in a Frequently Asked Questions format. Much of the content is based on questions Mayo Clinic experts are regularly asked, and the content is reviewed and fully vetted by staff physicians.

"The information is concise enough that the doctors can pull it up right when the patient is in the room, so that they don't have to go out of the room to do an exhaustive search and come back in," says Dr. Ommen.

Finally, AskMayoExpert provides patient education materials specific to a disease or condition. Rather than going to the lobby and finding a brochure, physicians can find condition-specific information while at the patient's bedside.

Online Learning Resources: Thanks to what the physician learned through AskMayoExpert, the patient's treatment is a success. Two days later, the patient leaves the hospital in normal sinus rhythm. No risk of stroke or bleeding. No symptoms of shortness of breath. The physician is interested in learning more about the evidence for the current treatment guidelines. She reviews the videos, book chapters and journal articles selected by experts on the subject. Then, she verifies her knowledge through self-assessment questions on AskMayoExpert, which awards her CME credits.

Online Learning Resources helps physicians pursue learning and earn credits in the context of their daily activities. When fully built, each AskMayoExpert topic will be accompanied by self-assessment questions that will test the physician's knowledge on the spot.

"At Mayo Clinic, 80 percent of learning happens in the clinical setting," says Dr. Lloyd. "ELS will help facilitate that learning."

ELS also can interface with governing bodies responsible for physician licensure and board certification.

Wisdom Lab: The physician's successful treatment of her patient was facilitated through a series of tools that alerted her and provided her with useful information. She learned from the process and treated the patient in a timely, informed and professional manner. Behind the scenes, even more happened. The entire sequence of events was automatically evaluated so ELS can continuously be improved.

ELS will constantly be assessed and revised through the Wisdom Lab. This ongoing, cognitive research will be used to enhance ELS to ensure that it supports clinical decision making.

"We named this component of ELS based on a quote from William Mayo, who said, 'Wisdom is knowledge translated to action,'" says Dr. Lloyd.

Additionally, ELS has the capability of tracking how physicians navigate through the system, allowing the Wisdom Lab to assess their knowledge both before and after the learning opportunities.

"One of the benefactors who helped launch ELS said, 'if you don't assess this utility, don't build it at all,'" says Dr. Lloyd. "This continuous evaluation is critical in ELS's success."

Medicine revolutionized

Increased information and evolving technology continue to revolutionize the way medicine is practiced.

"When I was in medical school, we had to call the lab for results. Then there were the dot matrix computers — I remember the 'wow' when we didn't have to call the lab for results every morning," says Dr. Lloyd. "Then there were terminals that we could use to pull up the results. And, this was in a course of just 20 years."

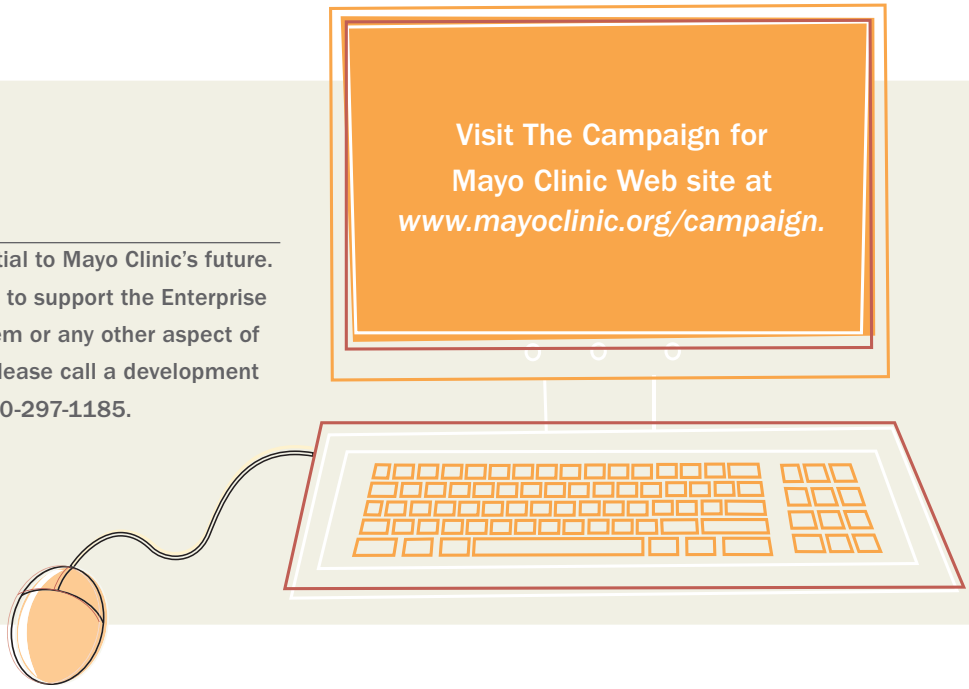
Now Drs. Lloyd and Ommen and a team of other Mayo Clinic experts are on the forefront of developing ELS, which will provide technology to ensure Mayo Clinic remains a leader in health care delivery.

"From my standpoint, there are a few key elements ELS addresses — safety and quality," says Dr. Ommen. "Pretty good isn't good enough anymore."

Safety and quality are two attributes that distinguish Mayo Clinic's practice, assuring that the needs of the patient come first. ELS technology will revolutionize care at Mayo Clinic and perhaps elsewhere.

"When we are successful here, it's not just going to help Mayo Clinic," says Dr. Ommen. "It's going to help health care around the world." ■

You are essential to Mayo Clinic's future. To make a gift to support the Enterprise Learning System or any other aspect of our mission, please call a development officer at 1-800-297-1185.



A medley of generosity

Three benefactors. Three stories. One is expressed in first person, one reaches into family history and another is told through survivors united to fulfill a legacy. Each expresses the heart of philanthropy, the passion of giving and the celebration of life. The dichotomy between the variety and the similarities in their stories unite in a medley of hope for today and the future.

Connecting to the human spirit

My mother believes my passion for music and the arts started with a set of drumsticks and my proclivity for drumming out songs all over her furniture. But actually, it's my mother who deserves the credit. She was a teacher with an amazing capacity to encourage and facilitate whatever you wanted to try — and then mobilize my father to support it. I progressed from drums to trombone to harmonica and Irish whistle.

The arts are now such an important part of our lives. I think the world would be cold and gray without them. So much of the timeless interconnection of humanity comes through the arts. It's an inherent aspect in the language of every culture, and it touches and enhances every aspect of life. And I think art and medicine have that in common.

My grandfather was a country doctor in the southwest corner of Minnesota. One of my most treasured possessions is a set of bells from his old sleigh, which was a birthday gift from my mother.

Bruce Clinton and his wife Martha pose with Mr. Clinton's mother Zylpha (center).

She is just shy of 104 years old now and still recalls lying in bed as a child and hearing the sound of those bells as her father would leave the stable to make emergency house calls on frigid snowy winter nights. Those bells have an extraordinary sound — like a heavenly choir — and they always remind me of the selfless tradition of dedication and service when medicine is practiced authentically as a profession — not a business.

My aunt recalls that my grandfather was acquainted with Drs. Will and Charlie Mayo, and she remembers their occasional visits to my grandfather's table in Canby, Minn. I'm told that at one time they were encouraging my grandfather to join them in their developing practice in Rochester.

My first direct encounter with Mayo Clinic was in 1967 when I met Edward C. Rosenow III, M.D. Over the years, our professional relationship evolved into a valued friendship. I came to understand the depth of his commitment to his profession and to his patients. For me, he became the personification of the finest ideals of the profession.

Many people consider the practice of medicine to be primarily a scientific endeavor. But embodied in the Mayo culture, I believe it is also an art form — that is, the connection between the patient and physician transcends the delivery of medical services. The preeminent value is the welfare of the patient and that goes well beyond the dispensing of opinions, medications or equipment.

In this day and age, there is no shortage of worthy causes that need and merit support. Our desire to establish a professorship with Mayo Clinic is an act of both respect and affection for Dr. Rosenow and his lifetime of service to his patients. The opportunity to join his name in perpetuity to Mayo Clinic is one of our most satisfying moments.

Here is a man who has devoted his entire adult life to serving his fellow man, and we feel so fortunate to be in a position to, in a very small way, connect ourselves to him and a life that has been so well-lived.

Our hope for this particular "investment" is that it would sustain this focus — on the values that uniquely define the "Art of Medicine" at Mayo Clinic because it is a towering concept. And 100 years from now, we want it to remain so. ■

Mr. and Mrs. Bruce Clinton are principal benefactors and members of the Mayo Clinic Greater Chicago Leadership Council. In 2007, their gift established the Edward C. Rosenow III, M.D., Professorship in the Art of Medicine.

Giving hope and housing

Ray and Lucille Gill's relationship with Mayo Clinic began 60 years ago when Mr. Gill's brother Wesley was diagnosed with a pituitary gland tumor. The lifesaving surgery Wesley underwent at Mayo Clinic allowed Mr. Gill to witness firsthand the hope Mayo Clinic provides its patients.

Mr. and Mrs. Gill, native Missourians, operate a family farm that spans 4,000 acres filled with corn, soybeans and other crops. But their farm, like their crops, grew from a small beginning. They started with only 20 acres.

"We always bought when and what nobody wanted," says Mr. Gill. "Oftentimes, we had to invest as much or more back into the land as we paid for the property in order to make it suitable for growing. The investment paid for itself at harvest time."

Following their successful model — buying as others shied away — Mr. and Mrs. Gill grew two additional successful businesses. One company specializes in oil and gas, and the other focuses on distressed municipal bonds.

Hard work and long-term thinking are ingrained in farm culture. So, too, is helping people in need. Ten years ago, Mr. and Mrs. Gill learned through their son's church in Independence, Mo., about a family facing a medical crisis. They were able to help by letting the family use their Arizona home, which they had purchased in order to be closer to Mayo Clinic. Although the Gills didn't regard their help as significant, they were touched by the gratefulness of the family.

Today, Mr. and Mrs. Gill are combining their desire to help people in need with their gratitude for the care Wesley and they received. "He lived a good and normal life thanks to Mayo," says Mr. Gill. "Mayo Clinic gave him a second chance."

Mr. and Mrs. Gill have chosen to focus their generosity on the Village at Mayo Clinic. "We saw the project and knew we needed to be part of it," says Mr. Gill. "It will help people more than we can begin to realize." The village at Mayo Clinic is an innovative community that provides long-term housing for patients recuperating from transplant and cancer treatment.

"Seeing how projects like this village are used encouraged our partnership in the project," says Mrs. Gill. "The hope it provides moves us."

Mr. and Mrs. Gill focus their philanthropy on projects that provide others with opportunity. Their previous giving has emphasized education projects, including a gift to William Jewell College for resources to build the student union.

In the Village at Mayo Clinic, Mr. and Mrs. Gill have found their next field. Through their philanthropy, they are sowing a new crop of hope in the lives of patients. ■

Lucille and Ray Gill

Ray and Lucille Gill are Mayo Clinic Major Benefactors.

The Directors of the William F. O'Connor Foundation (left to right): Mary Jane O'Connor, Mark Cermak, Mary Jo McGuire, Carol Hennessy, Joanne Unkovskoy

Carrying on a vision

He was a hub.

Everywhere he went, he made things happen … the kinds of accomplishments that made people stop and take notice. He was one of those people who got things done but took no personal credit for the achievement. That was his way.

As chair of the Chicago Board of Trade, William F. O'Connor was known to business colleagues as a "tenacious Irishman who elevated Chicago's financial markets to international prominence." To everyone else, he was known as Billy.

"Billy was one of those guys who could go from speaking to the board of directors of the Chicago Board of Trade one minute to conversing with a clerk on the floor the next. He was just an easygoing, genuine, nice guy," says Mark Cermak, one of five people who now oversee the O'Connor Foundation's donations in "Billy's" memory. Other members include his wife, Mary Jane O'Connor, Carol Hennessy, Joanne Unkovskoy and Mary Jo McGuire.

The foundation supports the arts and culture communities in the Chicago area and research into pediatric brain tumors and gastroenterology cancer at Mayo Clinic. Recently, a $15 million gift from the foundation established the William F. O'Connor Gastroenterology Clinic on the ninth floor of the Gonda Building on Mayo Clinic's Rochester campus.

Mr. O'Connor lost his battle with pancreatic cancer a decade ago; however, foundation members have kept his spirit alive by supporting his passions and remembering his incredible zest for life.

"Billy was a pilot. He drove motorcycles. He owned a biplane company. He was an avid tennis player and a sailor," says Mr. Cermak. In addition to his obvious fun-loving side, Mr. O'Connor was a meticulous planner, right to the end. "He formed the O'Connor Foundation before he died, and he carefully handpicked those who would best represent him."

"We make it our mission to give to areas that will have the greatest impact," says Ms. Hennessy. "Mark and I worked for him for many, many years. Mary Jane was his dear wife. Mary Jo was his good friend, and he knew Joanne from way back. Everyone knew each other a little, but the whole group didn't know each other well until we each discovered he had placed us on the board of his foundation. Some of us didn't even know we had been selected for this honor until after Billy passed. That was just his way. Billy handpicked each of us for a different reason. He was truly a visionary."

"I think he would be most proud of the things we have chosen to support in his name, particularly our support of Mayo Clinic," says his wife. "Billy was a very curious, adventurous intellectual. He used to say that his brain was always moving. He was always trying to figure things out. He was a very big-picture kind of guy who always saw opportunities instead of challenges. He had great vision. Mayo Clinic was always part of that vision." ■

The William F. O'Connor Foundation is a Mayo Clinic Philanthropic Partner.

Searching for a better test

Mayo Clinic doctor develops pain-free stomach procedure

Medical advances don't turn on a dime. They grow in an environment of experience and research. For many years, Mayo Clinic physician Michael Camilleri, M.D., had brought relief to hundreds of his patients who had stomach pain. His groundbreaking research in neurogastroenterology helped thousands more. But to help his patients, he often was faced with the unenviable task of administering a stomach volume diagnostic test (also called a gastric accommodation study). Seeking a less uncomfortable test for his patients, Dr. Camilleri has come up with a pain-free way to get the job done.

Who needs stomach volume testing?

Experiencing a sense of fullness and bloating after overeating is normal. But some people have discomfort even after a moderate or light meal. To find the cause, a doctor may order a stomach volume test to learn how well the stomach relaxes and expands to make room for a meal. This information is key to diagnosing and treating stomach ailments such as:

- Functional dyspepsia (chronic nausea, vomiting or pain)
- Stomach complications of diabetes
- Narrowing of the stomach's entry, an occasional side effect of surgery for gastroesophageal reflux disease (GERD)

One way to measure stomach volume involves swallowing a tube and inflating a 1-liter balloon in the stomach. Yes, it's as uncomfortable as it sounds, especially since the patient must be completely awake during the procedure. Drugs cannot be given for pain or to relax the patient because the medication would also relax the stomach muscles and affect the test results.

Thinking creatively

When Dr. Camilleri began his clinical practice at Mayo Clinic in the late 1980s, he used the balloon method exclusively. "The patient had to swallow a tube with an uninflated balloon on the end of it," he recalls. "The tube was about the width of an index finger. When it reached the stomach, the balloon was inflated and left in for about three hours. We could give nothing to relax the patient, nothing for the discomfort. In fact, it was so stressful for the patient that we never knew with certainty whether we were measuring the effect of stress or the dysfunction of the stomach. We realized we had to develop a noninvasive approach to measure the stomach relaxation response."

Dissatisfied with the test's accuracy and motivated by concern for his patients' comfort, Dr. Camilleri began working with colleagues in Radiology to develop a better test.

Over the next few years, Dr. Camilleri explored options. By the mid-1990s, he had a breakthrough, thanks to the development of imaging technology in other areas and his own research.

"The penny dropped when I remembered that if you give an intravenous injection of a certain isotope [a type of chemical element that acts as a radioactive tracer], it identifies acid-producing cells in the body," explains Dr. Camilleri.

He also knew that his colleagues in Cardiology used a technique called single-photon emission computed tomography (SPECT) to create 3-D images of the heart. So, he connected the fact that a particular isotope identifies acid-producing cells and the opportunity offered by SPECT technology to reconstruct the area of the stomach that produces acid (almost the entire stomach). He then worked with colleagues in Biomedical Imaging and Nuclear Medicine to improve the speed, safety, resolution and analysis of this type of radiographic imaging.

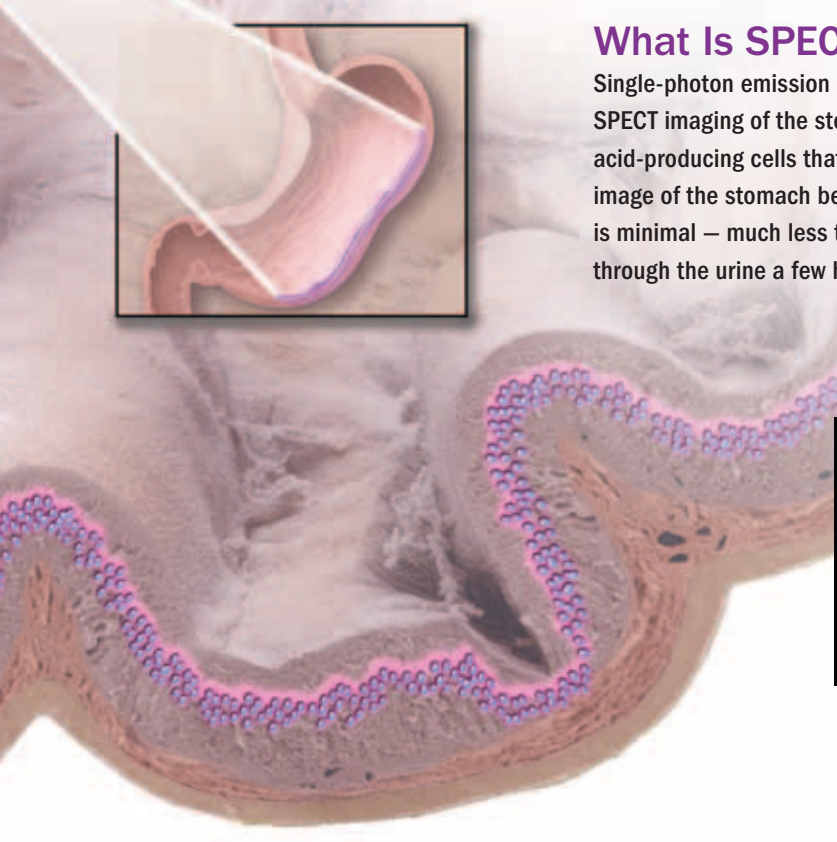
The SPECT stomach volume test

The SPECT test can be completed in about 45 minutes, and the only discomfort comes when imaging tracer is injected into the arm. The tracer circulates in the patient's system for about 10 minutes, enough time to react with stomach acid. The reaction "lights up" the stomach on the images created by the SPECT scan. Three scans are done: one of an empty stomach and two after a small meal, such as a nutrition drink. The second and third scans measure stomach volume after it has expanded from the ingested meal.

Within the hour, the doctor has "before and after pictures" of the stomach, the first step toward developing a treatment plan. Dr. Camilleri says, "Understanding how the stomach works after a meal gives us the basis to understand how symptoms develop. Disturbances of gastrointestinal function contribute to symptoms in one of every four adults."

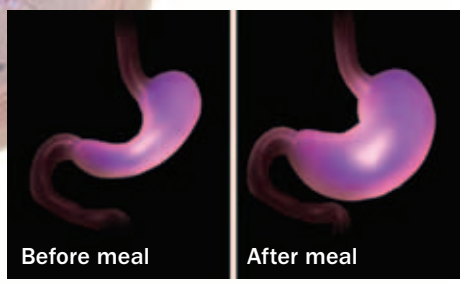
A better view

Using SPECT for stomach volume testing not only is pain free but also provides better information. Dr. Camilleri notes that at Mayo Clinic, SPECT imaging is the preferred method for gastric accommodation studies. Imaging and Physiology supervisor Duane Burton says, "We think the SPECT test is much more accurate. The rest of the world is starting to understand that this is the best technique for measuring gastric accommodation." SPECT is used elsewhere on a limited basis, but the balloon method is still the most common technique outside of Mayo Clinic.



What Is SPECT?

Single-photon emission computed tomography (SPECT) is a 3-D imaging technique. SPECT imaging of the stomach uses a slightly radioactive isotope to "light up" the acid-producing cells that cover 95 percent of the stomach lining, producing a detailed image of the stomach before and after a meal. Radiation exposure with a SPECT scan is minimal — much less than an average CT scan — and the tracer isotope is eliminated through the urine a few hours after the scan.



Lessons learned: Applying research results to obesity treatment

The lessons Dr. Camilleri learned through SPECT led him to a new research path that holds promise for obese and overweight people. He wonders, "Now that we understand more about how the stomach relaxes and expands, what can we do to change the function of the stomach to allow patients to develop fullness sooner and eat less?"

"Contrary to what you might expect, obese and overweight people do not necessarily have larger stomachs," Dr. Camilleri says. "What they do have is an inability to feel fullness as soon as other people. We are identifying ways to change how the stomach works to help people develop fullness easily after a meal so they decrease food intake."

A promising possibility is a pacemaker-like device with a wire surgically placed via laparoscopy (keyhole surgery). "We're very interested in seeing whether devices that change the function of the stomach — electrical devices that can block the vagus nerve — might have an effect on the feeling of fullness, help reduce patients' appetite and, therefore, help reduce patients' weight," Dr. Camilleri says.

Building on a tradition of success

Dr. Camilleri's work builds on a long line of Mayo Clinic accomplishments in gastroenterology dating back to the Mayo brothers' surgical practice. Mayo Clinic has been pioneering advances in digestive diseases research ever since. In fact, Mayo has been ranked No. 1 in gastroenterology by *U.S. News & World Report* since the inception of the magazine's hospital survey. In the area of digestive diseases, Mayo Clinic leads the country in these numbers: patients treated, publications in peer-reviewed journals and world-recognized experts.

"My work here at Mayo Clinic has been very rewarding, both personally and professionally," Dr. Camilleri says. "I've had the opportunity to work with world-class scientists and research staff, to teach and mentor our young researchers and physicians, and to spend time conducting research that really makes a difference in the treatments I can offer to my patients. Mayo really is committed to supporting the research work of its physicians because, in the end, that research benefits patients here and around the world."

Because digestive diseases have a profound impact on quality of life and can lead to disability and mortality, gastrointestinal (GI) research is included in The Campaign for Mayo Clinic. With benefactor support, Mayo's internationally recognized research can be accelerated. ■

A Comparison of Two Modes of Testing Gastric Accommodation (Stomach Volume)

	SPECT	Balloon
Prep	Overnight fast	Overnight fast
Procedure	A radioactive tracer is injected into your upper arm. In 10 minutes, you lie on a table and the SPECT machine rotates around you for the first scan. You are given a small meal (usually a nutrition drink). In 10 minutes, a second scan is done, then a third.	A tube with a deflated balloon attached is pushed down your esophagus and the balloon is inflated. The first stomach volume is calculated by measuring the balloon. You are given a small meal. The second stomach volume is calculated.
Test duration	45 minutes	3 to 4 hours
Measures	Measures volume of about 95% of stomach	Measures volume of balloon, which takes up only about two-thirds of stomach
Discomfort	Painless, no sedation needed	Uncomfortable, but no sedation allowed for nerves or pain
Radiation	Minimal exposure	No exposure
Patient position	Lying on table, similar to that used by CT or MRI scan	Semi-reclining

Spokes of gold

A clearer path toward global health gets wheels turning

The light suggested early morning, but the spring air was already warm, and the day promised a temperate breeze. Mambidzeni Madzivire climbed on her bicycle and set out for what would be a busy morning monitoring some of her experiments in Dr. Conover's lab at Saint Marys Hospital, to be followed by a stop at Dr. Greenleaf's ultrasound lab in the Medical Sciences building. Already she knew that the coming weekend — they were calling for rain — would be crowded with her research activities and putting final touches on an abstract for submission to the IEEE [Institute of Electrical and Electronics Engineers] conference. And although she was anxious to examine the data emerging from her studies in vascular imaging, the gentle Minnesota afternoon was a welcome diversion from school. After discussing her experiments with her mentor, Dr. Greenleaf, and completing a few tasks in Dr. Conover's wet lab, Mambi cycled toward the bike path along the river. She had much on her mind that day: sadness and excitement, frustration and hope. The sun glinted on the spokes, and she rode on.

As a doctoral student nearing completion of her Ph.D. in the biomedical engineering program in the Mayo Graduate School, Mambi looked forward to the time when her parents would come from Zimbabwe to the United States for her thesis defense. She had first come to Mayo as a summer intern [Summer Undergraduate Research Fellow] while completing her undergraduate degree at Smith College in Massachusetts. All that seemed so long ago, but it was during that period that Mambi first realized she wanted to pursue advanced studies not in the field of her major — physics — but in something a little more hands-on, something tangible with a clinical application, something with a real potential for making a difference to people.

Even in those early days of summer internships, Mambi found the professors at Mayo accessible and genuinely interested in her own scientific pursuits and where they might lead. They wanted her to succeed. Back then she had worked on cochlear implant research in Dr. Robb's lab, investigating methods to confirm the viability of the auditory nerve using medical imaging technology before surgery to avoid unnecessary procedures. Dr. Robb had said that, at Mayo, students are often the glue holding together the different labs. You see, he'd told her, through the design of research projects like the one she was proposing, projects that hack their way through traditional disciplinary boundaries to new frontiers, graduate students and their professors and mentors forge the kind of collaborations and cross-pollination of expertise that makes the Mayo Graduate School one of the best in the country.

So Mambi had taken a risk. Not in coming to Mayo, that was an easy choice, but in entering an emergent and highly specialized field like biomedical engineering. Her doctoral research would mean that she would have two mentors in two distinct fields. It would entail a complex interdisciplinary mix of imaging and endocrinology, of nanotechnology and physiology; and she would work with infinitesimal nanoparticles that would someday help identify the vulnerable arterial plaques that break off and dam up the bloodstream causing heart attack and stroke.

Mambi conducts an experiment on vascular tissue sections in Dr. Conover's lab at St. Marys Hospital. One of the advantages of doing research at Mayo is ready access to clinically-relevant tissue specimens.

And it had been a challenging project so far. Mambi's research mixed seemingly opposing aspects of physiology, engineering and physics; plus, she'd learned about sophisticated imaging equipment and how to carry out in-depth troubleshooting on unbelievably sensitive instrumentation. Working in nanotechnology, she was joining other researchers around the world who were breaking ground in nanomedicine, figuring out how to use tiny particles to heal wounds faster, deliver medication with more precision or create sensors to seek out ailments with atomic-level accuracy at the molecular level.

But that afternoon, as she cycled her way along the trail, breathing in the smell of the river bank, she did not think about her research. Mambi's mind was back in Zimbabwe, with an old friend. He was a medical doctor.

She had seen him on her last trip home when he had invited her to visit the main hospital in Harare. They had known one another in high school, but while Mambi had followed her older sister and gone to the United States and then Japan to study, he'd stayed at home and attended medical school. As he toured her through the hospital facility pointing out the worn and obsolete medical instruments and broken equipment for which there was no spare parts, and no technicians to fix them, they both understood the problem — he, because it prevented him from doing his life's work, and, she, because it determined hers. The fact that Mambi was studying at Mayo meant that she saw every day and knew firsthand Mayo Clinic's commitment to clinical medicine, medical education and research, and to a model of care that put patients' needs before all else. But in seeing her old friend again and the hospital in Harare, Mambi was struck by how Mayo's commitment depended not only on its future vision, but the technologies and engineering that supported it.

So she'd come back to the United States determined to find out about international health activities at Mayo Clinic. What she'd found was that people from Mayo Clinic were quietly participating in international health activities, and had been for a long time: medical students and faculty had traveled great distances to volunteer their expertise to people in underserved areas of the world. She was pleased and surprised when, eventually, she'd connected with Dr. John Wilson. Dr. Wilson and a number of his colleagues were in the midst of organizing a Program in Underserved Global Health sponsored by the Department of Medicine, and he'd invited her in on the ground floor to help, as a founding member. And as Mambi coasted on her bicycle, on that trail, on that gentle Minnesota afternoon, she thought about her connection to Zimbabwe and her family, and her old high school friend, and Mayo's activities in global health, and the smooth mechanical clicking of the bike's gears, and her thoughts went on and on.

Now, it is March 16, 2008, and Mambi listens to the low hum of seven hundred voices in an auditorium at Tulane University. The lighting, already dimmed, leaches color from the surroundings and turns everything and everyone ochre. She is in New Orleans for the inaugural meeting of the Clinton Global Initiative University (CGI U), an arm of the Clinton Global Initiative that has as its purpose to engage

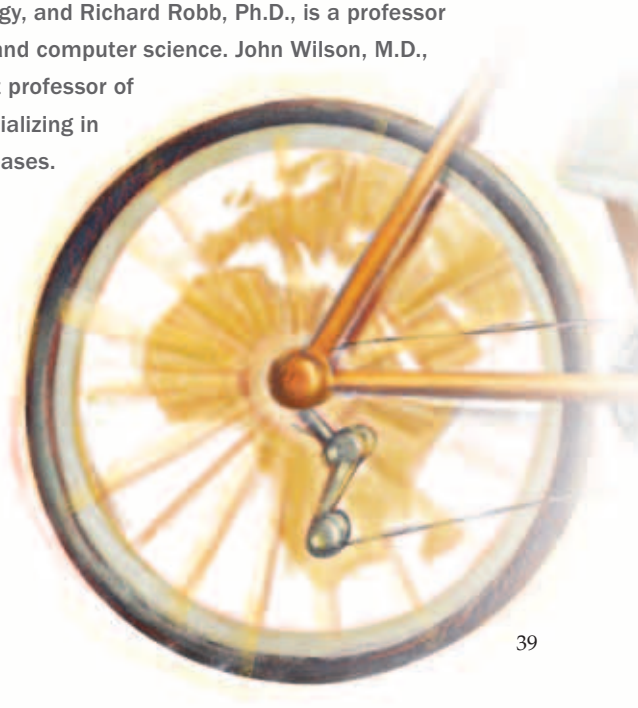
and organize the next generation of leaders on campuses in the United States and around the world. Through the CGI U, universities and students, individually or in groups, make formal proposals to carry out high-impact work that creates sustainable social change in areas like climate change, human rights, poverty alleviation, and global health.

Mambi sits in the front row where she has been ushered by the conference organizers; she is one of 44 others from 15 different countries whose proposal for social change was chosen to receive an Outstanding Commitment Award. She has just learned that former President Bill Clinton will call her to the stage. This is a surprise to her, and she is a little confused because she thinks that other commitments are more deserving of recognition. But Mambi is delighted nonetheless. Her Commitment to Action is called "Ensuring the Sustainability of Donated Medical Technology."

She is introduced to the conference delegates by President Clinton, who pronounces her name with something close to the poetic lilt she automatically gives it: "Mambidzeni Madzivire," he says. She approaches the stage where he waits to shake her hand. "Mambidzeni Madzivire of the Mayo Graduate School is committed to examining ways in which her peers at Mayo can assist in providing medical technology through the donation and rehabilitation of used medical equipment to communities that need it the most." President Clinton goes on to say that those involved with this commitment will identify the needs of health care facilities, build a database of students and staff who have expertise in global health, and train engineers and technicians in developing countries to repair donated medical equipment.

She hears him say that today's generation of young people has more power to change the course of our future than any previous generation. She thinks he is right. But she knows it is not about being a Mayo graduate student, or even a Mayo doctor or researcher. "You know," she thinks, "it really is about the patient." And at that moment Mambi realizes something about the nature of her own contribution to the patient. She knows that getting the best education she can get allows her to be the best student she can be, and that by doing all she can for colleagues everywhere, Mambi Madzivire is part of the Mayo Clinic mission. ■

James Greenleaf, Ph.D., is a professor of biophysics and associate professor of medicine. Cheryl Conover, Ph.D., is a professor of medicine and an investigator in the field of endocrinology, and Richard Robb, Ph.D., is a professor in biophysics and computer science. John Wilson, M.D., is an assistant professor of medicine specializing in infectious diseases.



News at Mayo Clinic


William Rupp, M.D.

New Florida CEO off to fast start

Given his resume in healthcare quality, efficiency and financial performance, it was no surprise that William Rupp, M.D., named these as his top priorities when he started his tenure as chief executive officer of the Florida campus on Nov. 21.

Six months later, exciting progress is occurring in all of those areas. On the patient safety front, the campus is proceeding with a plan to eliminate all health-care acquired infections by 2010. Several efficiency efforts are under way. A review of operating room procedures is occurring to increase the number of surgeries that can be performed daily, and the campus has launched LEAN, a continuous improvement philosophy that will streamline processes and allow staff to spend more time with patients. And financially, the campus is meeting its revenue targets despite the difficult economy.

A graduate of the University of Minnesota Medical School and a board-certified oncologist, Dr. Rupp achieved similar results as CEO of two hospitals in Mayo Health System, a network of community hospitals in the Midwest. He visited the Florida campus for the first time last summer, as part of a team charged with improving its operations.

"I was partially retired, but I fell in love with the place and its staff," he says. "We have an incredible campus, and our staff is focused and devoted to our patients and Mayo's mission." ■

The Mayo Clinic Board of Trustees welcomes new members and elected officers

Brad Anderson, the vice chairman and chief executive officer of Best Buy, Inc., a multinational retailer of technology and entertainment products and services, has joined the Mayo Clinic board as a public trustee. A. Dano Davis, Louis Gonda and Marilyn Carlson Nelson were re-elected to four-year terms as public trustees.

R. Scott Gorman, M.D. and William Rupp, M.D. were named internal trustees for four-year terms. Dawn Milliner, M.D. and Jeffrey Korsmo were elected to one-year terms as internal trustees.

Senator Thomas A. Daschle, George B. Bartley, M.D. and Franklyn Prendergast, M.D. were recognized for completion of their service as trustees. Mr. C. Dale Rustad was honored for his 40 years of continuous staff support to the Board of Trustees.

Mayo Clinic's 2009 Officers include President and Chief Executive Officer Denis Cortese, M.D. and five vice presidents: Chief Administrative Officer Shirley Weis; Glenn Forbes, M.D.; William Rupp, M.D.; Nina Schwenk, M.D. and Victor Trastek, M.D. ■

Trustees honor six Mayo Clinic named professors

Named professorships represent the highest academic distinction for a Mayo Clinic faculty member. Faculty are appointed to a named professorship through nomination and endorsement of their peers and then confirmed by Mayo Clinic senior leadership. Appointed individuals are recognized for distinguished achievement in their specialty areas and service to the institution.

These professorships are named in honor of the benefactors. The gift funds, which may be unrestricted or focused on a specific medical area, are held in endowment. All income from the endowed professorships supports Mayo Clinic programs in medical education and research.

Diane Jelinek, Ph.D., a consultant in the Department of Immunology, received the Gene and Mary Lou Kurtz Professorship in Multiple Myeloma Research. Gene Kurtz founded Houston Foam Plastics, one of the nation's largest producers of custom foam packaging, construction and insulation materials, in 1970. The Kurtzes are Mayo Clinic friends, patients and benefactors.

Their leadership is evident in their philanthropic contributions and participation in the Mayo Clinic Cancer Leadership Council.

Dr. Jelinek, who joined Mayo Clinic in 1991, is dean of Mayo Graduate School and a member of the Mayo Clinic Rochester Executive Board. She has served in organizations that include the American Association for Cancer Research, American Association of Immunologists and American Society of Hematology. She has been active as a scientific reviewer for numerous scholarly journals and the National Institutes of Health (NIH), and in addition to extensive ad hoc review service, she completed a four-year term as a charter member of the Cellular and Molecular Immunology B study section. Throughout her career, Dr. Jelinek has been funded by the NIH for her work on normal and malignant B lymphocytes. She currently serves as the program director for a project on the monoclonal gammopathies funded by the National Cancer Institute.

Sundeep Khosla, M.D., a Mayo Clinic endocrinologist, received the Dr. Francis Chucker and Nathan Landow Research Professorship, which Dr. Chucker established in 2005 in honor of his friend Nathan Landow, a highly successful real estate developer and philanthropist from Washington, D.C. Dr. Chucker, a founding member of The Doctors Mayo Society and Mayo Alumni Laureates, settled in Washington and established an internal medicine and peripheral vascular disease practice after completing a fellowship at Mayo Clinic.

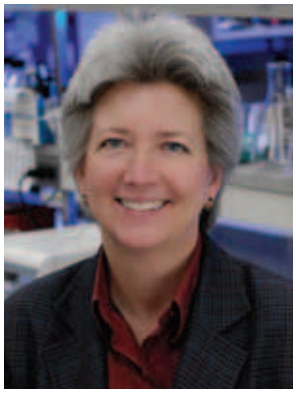
Dr. Khosla, who joined Mayo Clinic in 1988, is associate director for Research and also is associate director of the Clinical Research Unit. He has served as chair of the National Institutes of Health Skeletal Biology Development and Disease Study Section and has been appointed to the Council of the National Institute on Aging. He has been elected to the American Society for Clinical Investigation and the Association of American Physicians. He currently serves as associate editor of the *Journal of Bone and Mineral Research* and as a member of the editorial boards for several other journals. His research interests include mechanisms of postmenopausal and age-related bone loss, sex steroid regulation of bone metabolism and osteoblast/stem cell biology.

Svetomir Markovic, M.D., Ph.D., who holds the academic rank of professor of medicine and associate professor of oncology, was recognized with distinction as the Charles F. Mathy Professor in Melanoma Research, which was established by Leah Mathy and her family to honor their husband and father. The late Charles Mathy, a leading La Crosse, Wis., area businessman and owner of Mathy Construction Company, was a contributing force in the 1995 partnering of Franciscan Health System, Skemp Clinic and Mayo Clinic, serving on the advisory board.

Dr. Markovic is a member of many professional societies and serves as reviewer for several medical journals. He participates in educational activities, such as curriculum/course development, teaching and mentoring. He has given national and international presentations and has authored numerous articles, abstracts and letters.

Dr. Markovic's main clinical practice interests are focused on the use of emerging immunotherapeutics for the treatment of malignant diseases. His research interests include translational research utilizing laboratory developments in basic immunology and applying them to hematology/oncology clinical research and practice. In addition, he conducts laboratory research on the immune system as a therapeutic tool in the treatment of metastatic melanoma and lymphoma.

Douglas Packer, M.D., director of Heart Rhythm Services, received the John M. Nasseff, Sr., Professorship in Cardiology in Honor of Dr. Burton Onofrio. Mr. Nasseff is a well-known philanthropist who worked his way from unloading boxcars at West


Diane Jelinek, Ph.D.,


Sundeep Khosla, M.D.


Svetomir Markovic, M.D., Ph.D.


Douglas Packer, M.D.

Publishing Co. to become its vice president of engineering and development. He has contributed to several of Mayo Clinic's education and research programs, including rheumatology and neurologic surgery research, and named this professorship in honor of Dr. Onofrio, a Mayo Clinic neurosurgeon who performed lifesaving surgery for Mr. Nasseff's youngest son, Arthur.

Dr. Packer, director of Mayo Clinic's Translational Electrophysiology Research Laboratory, is active in the National Heart Rhythm Society where he is the first vice president and 2009 president-elect. He has served on editorial boards for several journals and on National Heart, Lung, and Blood Institute working groups on atrial fibrillation. Dr. Packer's translational work focuses on autologous fibroblast modulation of electrical impulse propagation in the heart and the mechanisms and ablation of atrial fibrillation and other cardiac arrhythmias.

Mark Warner, M.D., a consultant in the Department of Anesthesiology, is the recipient of the Walter and Leonore Annenberg Professorship in Anesthesiology Honoring Daniel R. Brown, M.D., Ph.D. This is the fourth Annenberg professorship established at Mayo Clinic, and it honors Dr. Brown, the associate director of the Multidisciplinary Critical Care Service and the chair of the Division of Intensive Care and Respiratory Therapy in the Department of Anesthesiology. Mr. Annenberg was a distinguished editor, publisher and broadcast pioneer. Mrs. Annenberg, former chief of protocol for the United States, served as the chair and president of the Annenberg Foundation.

Dr. Warner currently serves as dean of Mayo School of Graduate Medical Education and in many other leadership roles, both nationally and at Mayo. He is the current president of the American Board of Anesthesiology and the president-elect of the American Society of Anesthesiologists. He serves on the executive committees of the Anesthesia Patient Safety Foundation, the Foundation for Anesthesia Education and Research and the Academy of Anesthesiology. He is an editor of the *Journal of Anesthesiology*. Within Mayo, Dr. Warner is former chair of the Department of Anesthesiology. He currently is a member of the Mayo Clinic Rochester Executive Board and chairs its Administrative Committee.

Dr. Warner's clinical interests focus on pediatric anesthesia and health care administration. His research concentrates on epidemiology and quality assessment of anesthetic care and perioperative outcomes measurement.

Walter Wilson, M.D., a specialist in infectious diseases, received the Edward C. Rosenow, III, M.D. Professorship in the Art of Medicine, which was established in 2007 by Bruce E. and Martha O. Clinton. Bruce Clinton is chairman and chief executive officer of The Clinton Companies, a Chicago real estate development and property management company. The Clintons have been Mayo Clinic patients for more than four decades and are members of The Campaign for Mayo Clinic Chicago Leadership Council. They are patients both in Rochester and Florida and have developed a special relationship with Dr. Rosenow, their longtime physician.

Dr. Wilson is a recipient of the Excellence in Leadership Award, Henry S. Plummer Award and the Mayo Distinguished Clinician Award at Mayo Clinic. Active in many professional and community organizations, Dr. Wilson currently serves in positions for the American Heart Association, International Committee on Treatment of Infective Endocarditis, Task Force for Infectious Diseases and International Society of Infective Endocarditis.

He has been teaching infectious diseases courses at Mayo Clinic for more than 30 years, receiving the Teacher of the Year award several times, as well as the Mayo Medical School Distinguished Faculty Service Award and Distinguished Lecturer Medical Sciences recognition, and has been named to the Teacher of the Year Hall of Fame. Dr. Wilson's research interests include infective endocarditis, animal models of infection and new antimicrobial agents. ■


Mark Warner, M.D.


Walter Wilson, M.D.

Honoring philanthropy

Mayo Clinic publicly honors the many friends who form a productive partnership with Mayo through leadership support of programs and facilities that ensure continued excellence. Philanthropic gifts of all sizes help Mayo Clinic provide the best care to every patient every day and support medical innovations that benefit people throughout the United States and around the world.

We are honored to recognize Mayo benefactors who support our mission in the following ways.

Philanthropic Partners represents the top tier of Mayo Clinic benefactors, those who have contributed $10 million or more cumulatively. Individuals and organizations who make up this elite group represent the foremost supporters of Mayo. They are recognized in perpetuity in the Mathews Grand Lobby and in the Hall of Benefactors at Mayo Clinic in Rochester. Philanthropic Partners who support our work in Florida or Arizona also are recognized accordingly in the Halls of Benefactors on those campuses.

Principal Benefactors is a select group of individuals and organizations that demonstrate their distinctive leadership by committing $1 million to $9,999,999 to support the mission of Mayo Clinic. These individuals and organizations are recognized in perpetuity in the Hall of Benefactors at Mayo Clinic in Rochester. Those who support our work in Florida or Arizona are recognized in the Hall of Benefactors on the respective campus.

Contact: James Hodge
hodge.james@mayo.edu

Major Benefactors represents those who have made generous contributions of $100,000 to $999,999, continuing the remarkable philanthropic tradition that has been a part of Mayo Clinic since its founding. Major Benefactors are recognized in perpetuity at Mayo Clinic's Hall of Benefactors in Rochester — and in Florida and Arizona as appropriate.

Contact: Cynthia R. Nelson
nelson.cynthia2@mayo.edu

The Doctors Mayo Society was established in 1977 by the Mayo Clinic Alumni Association. The society recognizes Mayo alumni philanthropic leaders and provides a way for alumni to stay connected with Mayo. Members are recognized in electronic recognition kiosks in the Halls of Benefactors at all three sites.

Contact: Robert Giere
giere.robert@mayo.edu

The Mayo Legacy is an organization of Mayo patients, staff and benefactors who provide a bequest in their will or another type of planned gift to support our work. Members are recognized in electronic recognition kiosks in the Halls of Benefactors at all three sites.

Contact: Laird Yock
yock.laird@mayo.edu

Annual Giving emphasizes the importance of annual support and the need for a strong financial base to meet the challenges and opportunities each year. These benefactors give $1,000 or more annually (Jan. 1 to Dec. 31) and are recognized in electronic recognition kiosks in the Halls of Benefactors at all three sites.

$50,000 to $99,999	Mayo Leadership Circle
$25,000 to $49,999	Mayo Ambassadors
$10,000 to $24,999	Mayo Sponsors
$5,000 to $9,999	Mayo Stewards
$2,500 to $4,999	Mayo Patrons
$1,000 to $2,499	Mayo Friends

Contact: Jim Isaak
isaak.jim@mayo.edu

For more information on philanthropy at Mayo, please visit:
www.mayoclinic.org/development.

2009 Mayo Clinic Board of Trustees

EXTERNAL TRUSTEES

Bradbury H. (Brad) Anderson
Vice Chair and CEO
Best Buy Co., Inc.
Richfield, Minn.

James L. Barksdale
Chair
Barksdale Management Corporation
Ridgeland, Miss.

Thomas J. (Tom) Brokaw
Special Correspondent
NBC News
New York, N.Y.

France A. Córdova, Ph.D.
President
Purdue University
West Lafayette, Ind.

A. Dano Davis
Former Chair, Board of Directors
Winn-Dixie Stores, Inc.
Jacksonville, Fla.

Louis L. Gonda
President
Lexington Commercial Holdings
Beverly Hills, Calif.

Roy A. Herberger, Ph.D.
President Emeritus
Thunderbird School of Global Management
Phoenix, Ariz.

Patricia E. Mitchell
President and CEO
The Paley Center for Media
New York, N.Y.

Marilyn Carlson Nelson
Chairman
Carlson Companies, Inc.
Minneapolis, Minn.

Ronald L. Olson
Partner
Munger, Tolles & Olson, LLP
Los Angeles, Calif.

Aulana L. Peters
Retired Partner
Gibson, Dunn & Crutcher, LLP
Los Angeles, Calif.

Hugh B. Price
John L. Weinberg/Goldman Sachs Visiting Professor
Woodrow Wilson School
Princeton University
Princeton, N.J.

Lee R. Raymond, Ph.D.
Retired Chair of the Board
ExxonMobil Corporation
Irving, Texas

Anne M. Tatlock
Retired Chairman and CEO
Fiduciary Trust Company International
New York, N.Y.

INTERNAL TRUSTEES

Denis A. Cortese, M.D.
President and CEO
Mayo Clinic

Richard L. Ehman, M.D.
Consultant, MRI Research
Mayo Clinic Rochester

Glenn S. Forbes, M.D.
Vice President and CEO
Mayo Clinic Rochester

R. Scott Gorman, M.D.
Consultant, Internal Medicine
Mayo Clinic Arizona

Jeffrey O. Korsmo
Executive Director
Mayo Clinic Health Policy Center
Mayo Clinic

Jack P. Leventhal, M.D.
Consultant, Pulmonary Medicine
Mayo Clinic Florida

Dawn S. Milliner, M.D.
Consultant, Nephrology
Mayo Clinic Rochester

Robert E. Nesse, M.D.
President and CEO
Franciscan Skemp Healthcare
Mayo Health System

Kerry D. Olsen, M.D.
Consultant, Otolaryngology
Mayo Clinic Rochester

William C. Rupp, M.D.
Vice President and CEO
Mayo Clinic Florida

Nina M. Schwenk, M.D.
Vice President, Mayo Clinic
Consultant, General Internal Medicine
Mayo Clinic Rochester

Craig A. Smoldt
Chair, Department of Facilities and Support
Support Services
Mayo Clinic Rochester

Victor F. Trastek, M.D.
Vice President and CEO
Mayo Clinic Arizona

Shirley A. Weis
Vice President and Chief Administrative Officer
Mayo Clinic

ADDITIONAL OFFICIALS

Jeffrey W. Bolton
Chief Financial Officer
Chair, Department of Finance
Mayo Clinic

James P. Lyddy, Ph.D.
Chair, Department of Development
Mayo Clinic

John H. Noseworthy, M.D.
Medical Director for Development
Mayo Clinic

Jonathan J. Oviatt
Secretary
Chief Legal Officer
Chair, Legal Department
Mayo Clinic

EMERITUS PUBLIC TRUSTEES

Lilyan H. Affinito
Robert E. Allen
H. Brewster Atwater Jr.
Ambassador Howard H. Baker Jr.
Barbara P. Bush
Catherine B. Cleary
John H. Dasburg
Allan R. DeBoer
George C. Dillon
Frances D. Fergusson, Ph.D.
Bert A. Getz
Hanna H. Gray, Ph.D.
Robert A. Hanson
W. Thomas Johnson Jr.
Sister June Kaiser
Richard L. Knowlton
Philip R. Lee, M.D.
Whitney MacMillan
Ambassador Charles T. Manatt
Joan D. Manley
J. Willard Marriott Jr.
Ambassador Donald F. McHenry
Newton N. Minow
Honorable Walter F. Mondale
Luis G. Nogales
Frederick W. Smith
Edson W. Spencer
Dr. Donald M. Stewart, D.P.A.
Paul A. Volcker
Rawleigh Warner Jr.
Robert C. Winters

Mayo Magazine

Published for benefactors and friends of Mayo Clinic.

Director of Communications: Suzanne Leaf-Brock

Editor: Patricia Odean

Mayo Magazine, Mayo Clinic
200 First Street NW
Rochester, MN 55905
(507) 266-0091
mayomagazine@mayo.edu
www.mayoclinic.org/development

Mayo is a not-for-profit 501(c)(3) charitable organization, and contributions are tax-deductible to the extent allowed by law.

MAYO CLINIC

MC2386-2301

4500 San Pablo Road
Jacksonville, FL 32224

200 First Street SW
Rochester, MN 55905

13400 East Shea Boulevard
Scottsdale, AZ 85259

www.mayoclinic.org

Printed on paper that contains a minimum of 10% post-consumer waste.

Your legacy has just begun.

A bequest is a simple and convenient way to provide you peace of mind. You understand the freedom and security that comes with good planning. A bequest enables you to designate a gift to Mayo Clinic that carries on your legacy of support for generations to come. We encourage you to share your final will or estate plan provision with Mayo Clinic to ensure that your wishes are properly followed and recognized. Call us today at 1-800-297-1185 or visit our Web site www.mayoclinic.plannedgifts.org to learn more.

MAYO CLINIC

MAYO CLINIC | OFFICE OF GIFT PLANNING | DEPARTMENT OF DEVELOPMENT

MAYO CLINIC

Department of Development
200 First Street SW
Rochester, Minnesota 55905

NON PROFIT
U.S. POSTAGE
PAID
JRC

ADDRESS SERVICE REQUESTED