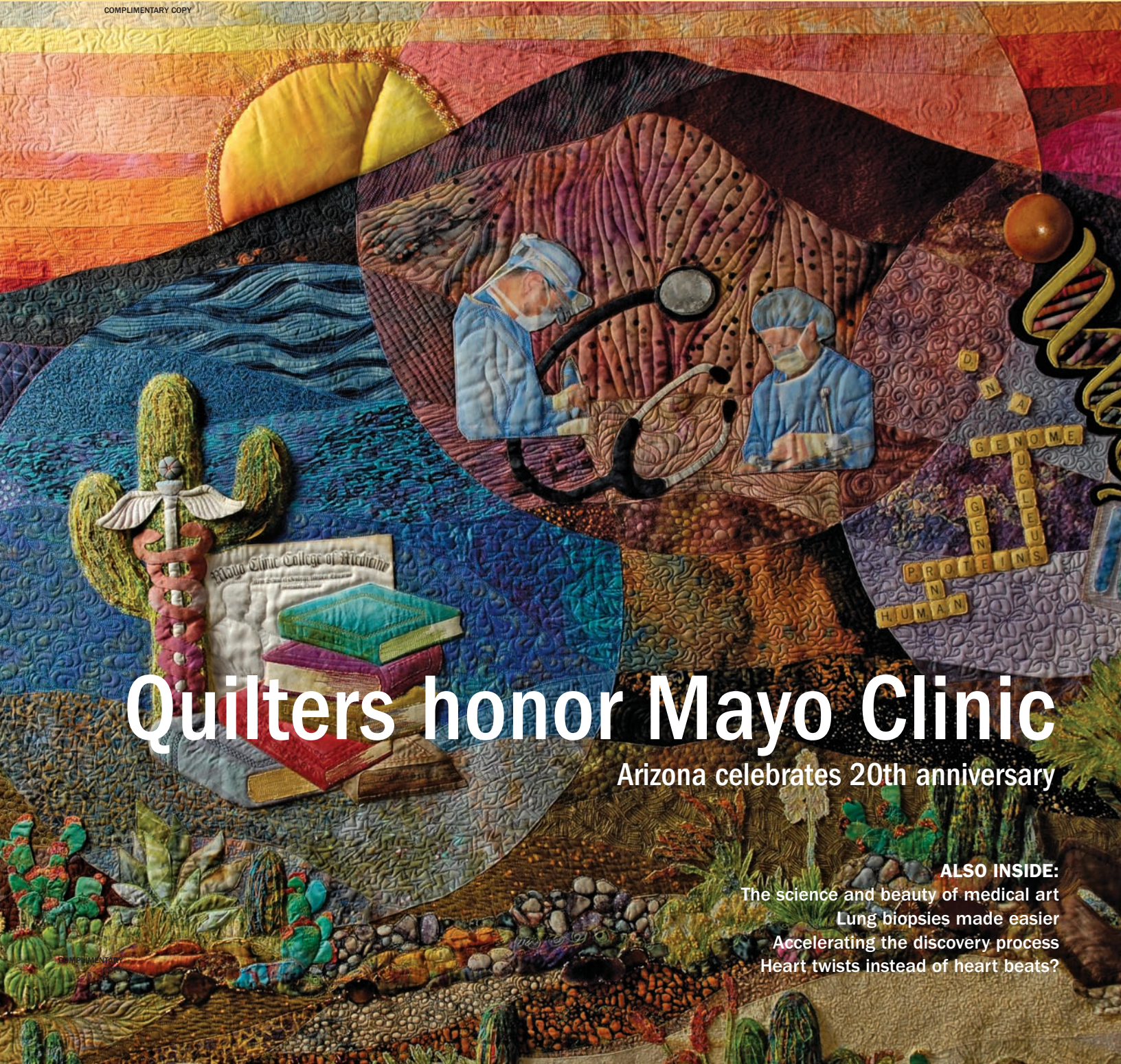


Mayo Magazine

SUMMER 2007

COMPLIMENTARY COPY



Quilters honor Mayo Clinic

Arizona celebrates 20th anniversary

ALSO INSIDE:

The science and beauty of medical art
Lung biopsies made easier
Accelerating the discovery process
Heart twists instead of heart beats?

COMPLIMENTARY

Mayo Magazine



page 2

FEATURES

- 2 Where art meets science**
The teamwork between medical illustrators and physicians provides diagnoses, answers and explanations for patients
- 8 One breath at a time**
Interactive breathing “game” allows doctors and patients to team up in conducting lung scans
- 10 Stopping cancer spread**
A protein involved in wound healing has a “two-faced” role as it plays a part in cancer metastasis
- 12 Revving up research**
Mayo combines efforts with institutions across the country to expedite nationwide research to bring discoveries to patients’ bedsides more quickly
- 16 Partnering for a purpose**
Mayo Clinic and the Indian Health Service collaborate to care for underserved Indian populations
- 18 The heart mechanic**
He was a mechanical engineer before he was a surgeon. Today, Dr. Francisco Arabia’s knowledge of engines and his dedication to that amazing machine, the human heart, results in cardiac assist devices
- 20 Thyroid cancer**
More-sensitive blood test improves patient care, cuts costs and saves time
- 22 A stitch in time**
Quilting team pays tribute to the 20th anniversary of Mayo Clinic Arizona with a 13-foot by 5-foot masterpiece of color, motion and intensity
- 28 Heart twists, not beats**
Redefining how the heart functions



page 12



page 22

DEPARTMENTS

- 30 A conversation with ...**
Michael Brennan, M.D., associate chair of the Department of Medicine spends much of his time advancing the altruistic teachings of the Drs. Mayo by educating others on the art of medicine — the ideal of treating the whole patient — mind, body and spirit
- 35 Stewardship report**
All the ways to make a difference with your philanthropic gifts
- 39 In the news at Mayo Clinic**
Mayo Clinic Jacksonville previews new lobby
- 44 Mayo Clinic Board of Trustees**
Public members take on leadership roles
- 45 Meet the people of Mayo Clinic**
Bridget Stensgard learned patience, diligence and focus growing up with 13 siblings on a farm near Rochester, Minn. These are traits she uses daily in her role as a research lab technician

page 45



A message from leadership

BRINGING DISCOVERIES TO PATIENT CARE

Discoveries happen frequently in medical research. Yet after the initial media splash, we often hear little else about how that discovery improved patients' lives. Why? Simply put, researchers across the nation historically have emphasized the science behind the discovery and not the importance of translating that science for patient use.

To address this challenge, the National Institutes of Health has created Clinical and Translational Science Awards to help the discovery-to-translation process. Mayo Clinic is one of 12 health care centers in the United States to receive this award.

As a result of this funding, Mayo will accelerate training for clinical research teams. The goals will be to improve the tools and facilities used by these teams, help our scientists navigate the regulatory process and provide the resources to test the feasibility of our medical discoveries. Two leaders of Mayo's Center for Translational Science Activities are Robert Rizza, M.D., director for research, and David Warner, M.D., associate director for clinical and translational research. We are confident that with their help, discoveries made today will advance patient care more quickly than ever before.



Sincerely,

A handwritten signature in black ink that reads "Denis A. Cortese, M.D." in a cursive style.

Denis A. Cortese, M.D.

President and Chief Executive Officer, Mayo Clinic

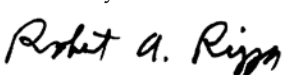
TOGETHER, WE CAN DO BETTER

Did you know the Pap smear existed more than 30 years before it was used as a routine exam for cervical cancer? Did you know that it took nearly 30 years after it was discovered before the anti-cancer drug Taxol was used to treat patients? Promising discoveries such as these can take as long as three decades before they are put into clinical application.

As one of 12 institutions selected for special funding by the National Institutes of Health (NIH), Mayo is working to accelerate nationwide research efforts to quickly bring discoveries to the bedsides of patients. This process is known as translational research.

As a charter member of this nationwide effort, Mayo Clinic will expand its Center for Translational Science Activities to help shape the national health care agenda and establish standards and best practices for clinical and translational research and education for years to come. As Mayo works to expedite this process, we invite our benefactors to join us as we shape the future of medicine. For more information on the Center for Translational Science Activities, please see page 12.

Sincerely,

A handwritten signature in black ink that reads "Robert A. Rizza" in a cursive style.

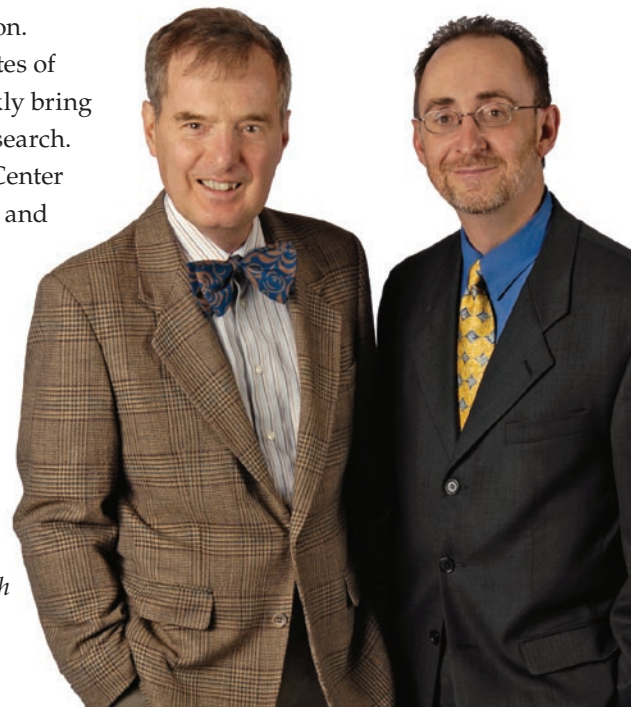
Robert Rizza, M.D.

Director for Research

A handwritten signature in black ink that reads "David Warner" in a cursive style.

David Warner, M.D.

Associate Director for Clinical and Translational Research



By Dianne M. Axen

WHERE ART MEETS SCIENCE:

Medical illustration

Months before surgery to separate conjoined twins at Mayo Clinic, a “team of teams” was already at work planning the procedure. Led by pediatric surgeon Christopher Moir, M.D., a team of more than 40 surgeons and staff were addressing surgical challenges of the operation.

“The model put it right out there in 3-D so our team could feel and touch and hold it.”

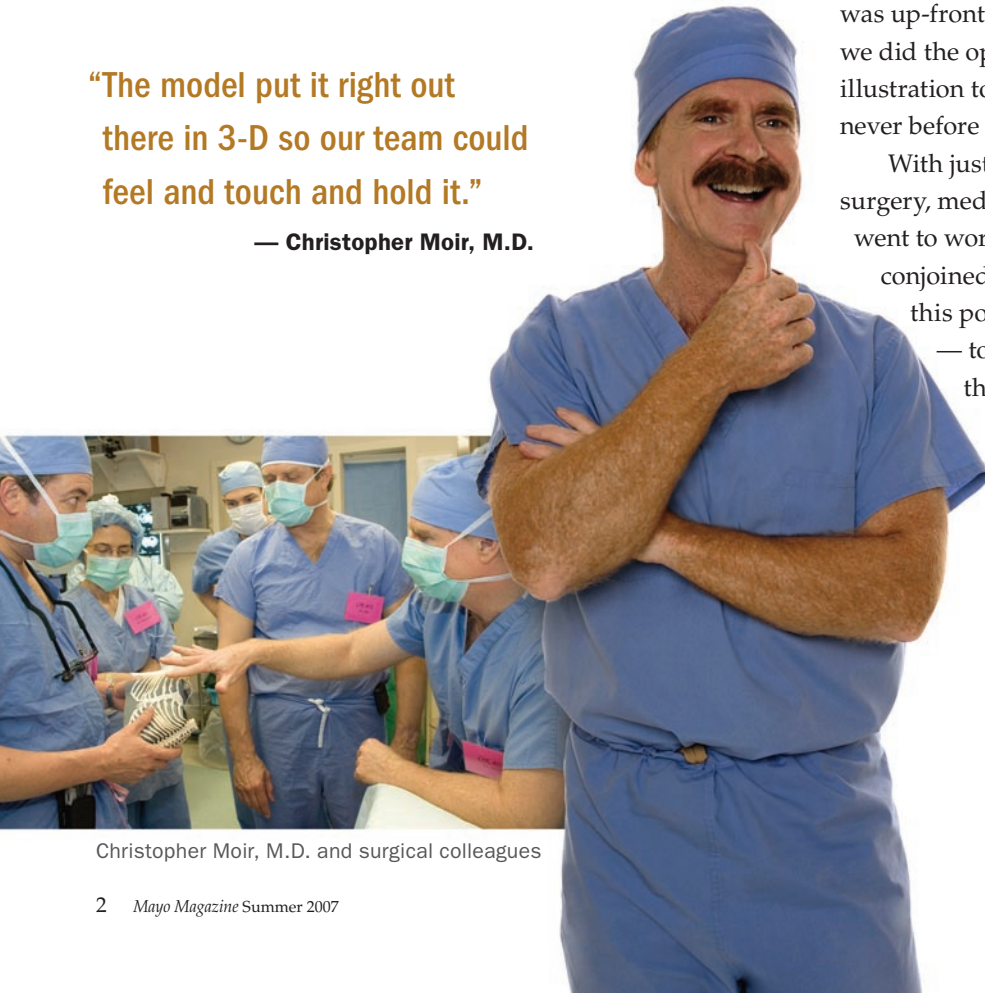
— Christopher Moir, M.D.

“We had to work together in ways we haven’t worked before,” says Dr. Moir, “and one of the most unique ways was up-front involvement of medical illustration before we did the operation.” Mayo has always used medical illustration to document procedures, but this group has never before been called in to help plan surgery.

With just a week to go before the twins’ separation surgery, medical illustrators and biomedical engineers went to work creating life-sized models of the twins’ conjoined rib cages. The surgical team had waited to this point in time — as close to surgery as possible — to have the models constructed. They needed the most timely information possible, and the twins were growing every day.

“The twins were conjoined at the chest,” explains Robert Morreale, medical illustrator for this surgical project and director of Mayo Medical Illustration and Animation. “And because cartilage isn’t visible on a CT scan, the team needed to know exactly how the ribs were connected.”

The first step for biomedical engineering was to take the most recent computed tomography (CT) scans of the twins’ bodies, and using Mayo software, document the



Christopher Moir, M.D. and surgical colleagues

Photos by (left to right): John Lemanski, Siddiqi Ray, Rick Madsen



Robert Morreale, medical illustrator

“Over the years, our tools and techniques have changed with the advancement of technology, but a medical illustrator’s primary objective has remained the same throughout time: to develop precise and scientifically accurate visual representations that educate and inform.”

— Robert Morreale

bone structure of the twins’ rib cages. Then, the data was sent to a company that produces a 3-D model by laying down thin layers of resin material to the exact specifications of the CT scan. This was accomplished literally overnight.

Now, a crucial piece of information needed to be added to the model — a depiction of the rib cartilage that could not be visualized on the CT scan. The model was handed over to Mr. Morreale for completion.

Using anatomical landmarks and his knowledge of developmental anatomy, he reconstructed the cartilage out of plasticine clay. As a result, the surgical team got an exact model of the areas they would have to reconstruct during surgery.

“The model put it right out there in 3-D so our team could feel and touch and hold it,” says Dr. Moir.

And following the successful separation of the twins, cardiovascular surgeon Joseph Dearani, M.D., voiced the ultimate praise. “The model was exactly what we saw,” he says.

Precision and accuracy are everything in the field of medical illustration, and collaboration between medical illustrator and physician is fundamental.

The partnership of artist and physician

Mayo’s team-oriented culture combines the desire to ease suffering with the desire to advance patient care through observation, research and education. With the best interest

of the patient as the primary consideration, the opinion of every member of the patient’s team is considered in an atmosphere of dignity and respect.

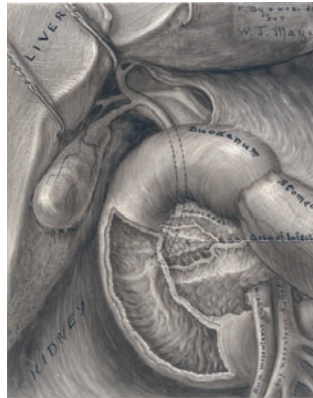
The teamwork among medical illustrators and physicians contributes to Mayo Clinic’s ability to provide comprehensive diagnoses, accurate answers and detailed explanations to patients.

“Team members are highly skilled, have superb experience and are more than willing to work together,” says Dr. Moir. “So when engineering and illustration are making the same models, they are complementing each other — not competing.”

“Medical illustrations are often thought of as something after the fact — as an educational or communication tool. Using medical illustration as necessary up-front patient care, as we did in the separation of conjoined twins, is taking 100 years of experience and pushing it forward as an innovation.

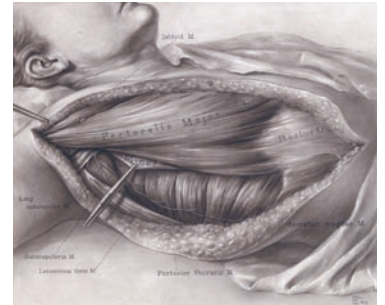
“I can see the operating rooms of the future having multiple wide-screen panels displaying illustrations and pertinent patient data. As surgeons, we are going to know more before we go in, and this will not only enhance our team understanding, it will improve patient care,” says Dr. Moir. ■

This year marks the 100th anniversary of medical illustration at Mayo Clinic. Today, Mayo Clinic's archive of medical illustration spans a century and contains more than 60,000 images.



Pancreatitis resulting from gallstone disease

Created by: Florence Byrnes
For: William J. Mayo, M.D.
Carbon dust, 1907



Anatomy of the chest wall

Created by: Eleanora Fry
For: Edward S. Judd, M.D.
Carbon dust, 1913

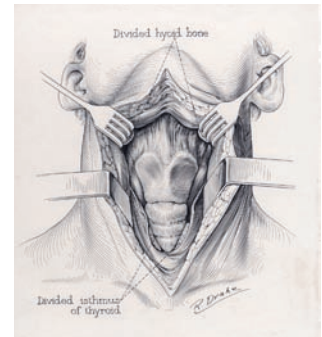
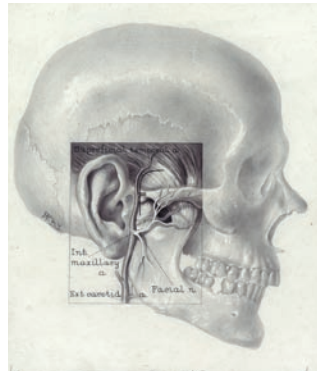
Members of the Mayo art studio at work around 1918. Pictured at right from left to right: Theodora Bergsland, Cora Olson and studio head Eleanora Fry.



Pictured below: David Factor, current medical illustrator



An art studio was established at Saint Marys Hospital in 1907. This photo was taken circa 1916. Pictured above from left to right: Eleanora Fry, Cora Olson and Russell Drake.



Diaphragmatic hernia

Created by: Eleanora Fry
 For: Donald C. Balfour, M.D.
 Carbon dust, 1915

Ankylosis of the jaw

Created by: Eleanora Fry
 For: Gordon B. New, M.D.
 Pencil and digitally rendered, 1918

Epithelioma of the limbus

Created by: Russell Drake
 For: Arthur U. Desjardins, M.D.
 Carbon dust, 1924

Laryngectomy

Created by: Russell Drake
 For: Gordon B. New, M.D.
 Pen-and-ink, 1928

The education and training of medical illustrators

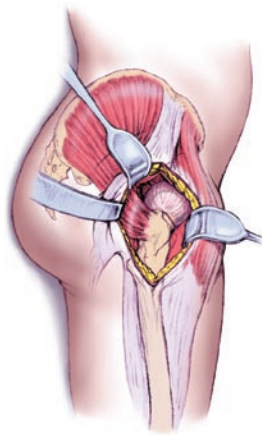
Formal training in medical illustration first began in 1911 at Johns Hopkins University School of Medicine in Baltimore, Md. Today, a master's degree in medical illustration is the best preparation for this career. Currently, there are four graduate programs in medical illustration in the United States and one in Canada that are accredited by the Association of Medical Illustrators and the Commission on Accreditation of Allied Health Education Programs.

A medical illustrator must often depict what cannot be observed directly to communicate an idea or complex topic, so an understanding of medical science is essential. Medical illustration students take courses alongside medical students in subjects such as gross anatomy, physiology and biology. Training includes dissecting and studying cadavers and observing medical procedures, surgeries and autopsies.

But medical illustrations must also be eye-catching, attractive and clearly communicate what the illustrator is trying to express. Therefore, medical illustrators also must be top-notch artists. The curriculum for medical illustration is about half science and half art. Precision is one of the most important aspects of a successful medical illustrator. Students develop skills in a wide range of media such as medical and surgical artistry and animation. Education is evolving as new tools and technologies are developed.

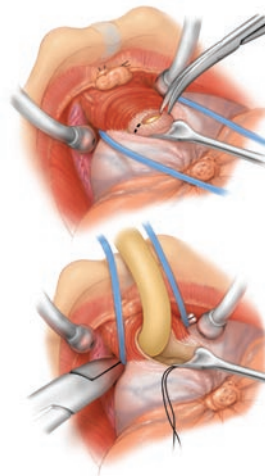
Medical illustrators document subjects in astounding detail and bring a creative perspective to the work that cannot be duplicated by other media. The work of medical illustrators is published in many venues for national and international audiences. ■

Precision and accuracy are everything in the field of medical illustration, and collaboration between medical illustrator and physician is fundamental.



Lateral approach to the joint capsule of the hip

Created by: Carl Clingman
For: Mir H. Ali, M.D., Ph.D.
Pencil and digitally rendered, 2006



Retropubic prostatectomy

Created by: David Factor
For: Robert P. Myers, M.D.
Pencil and digitally rendered, 2006



Posterior superficial and deep muscles

Created by: John Hagen
For: *Mayo Clinic Family Health Book*
Airbrush and watercolor, 1988

The world of Mayo medical illustration

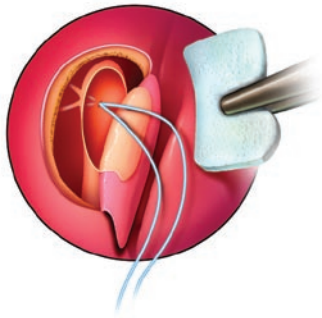
Medical illustrators are specially trained artists who communicate complex medical and scientific information and concepts in a meaningful, aesthetic and understandable manner. Medical illustration has been around for hundreds of years, but as a profession, it has a more recent history.

For Mayo Clinic, this year marks the 100th anniversary of medical illustration. In 1907, Mayo hired Florence Byrnes as the first full-time artist in the Mayo laboratory department. The illustration department at Mayo Clinic was one of the first medical facilities in the country to employ professional medical artists. Today, Mayo Clinic's archive of medical illustration spans a century and contains more than 60,000 images.

This year, in recognition of a century of medical illustration, some of Mayo Clinic's world-class collection of medical illustrations were featured at the Rochester Art Center, Rochester, Minn. The exhibit's title, *Scalpel to Sketch: The Science and Beauty of Medical Illustration at Mayo Clinic*,

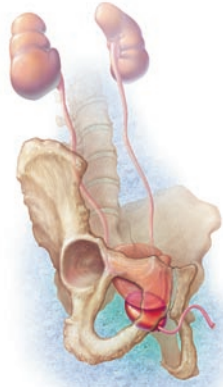
represented the affinity of science and art in understanding the human condition. This was the first museum exhibition of medical illustration from Mayo Clinic.

The exhibit provided an interesting visual account of Mayo's history, with illustrations dating from 1907 to present day. In the early 20th century, there were primarily two traditional media applications used to create medical art — carbon dust and pen-and-ink. Today, medical illustrators use a wide range of media. Some sketch or paint by hand, some use airbrushes, pen-and-ink or oils, some use computers to create images. Some make 3-D anatomical models out of clay and plastics as was done for the conjoined twins. Some medical illustrators create digital animations that demonstrate surgical techniques, biological processes and human development. And still others design and construct prostheses or artificial limbs. All of the work in medical illustration at Mayo Clinic has the ultimate goal of meeting the needs of the patient. ■



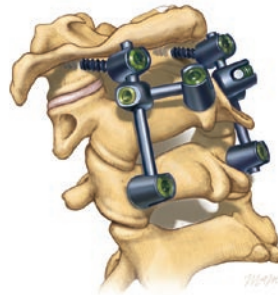
Dacryocystorhinostomy with transillumination of the lacrimal sac

Created by: Joanna King
 For: John J. Woog, M.D.
 Pencil and digitally rendered, 2006



Prostate and urinary system

Created by: Michael King
 For: *Mayo Clinic Health Letter*
 Pencil and digitally rendered, 2000



Cervical Vertebrae Polyaxial Screw/Rod Fixation

Created by: Alice McKinney
 For: Eric W. Nottmeier, M.D.
 Pencil and digitally rendered, 2006



Temporal Bone: inferior view

Created by: Robert Morreale
 For: Christopher F. Viozzi, M.D.
 Pencil and digitally rendered, 2006



SCALPEL TO SKETCH

This was the first museum exhibition of medical illustration from Mayo Clinic.

Some of Mayo Clinic's world-class collection of medical illustrations were featured at the Rochester Art Center in Rochester, Minn. The exhibit's title, *Scalpel to Sketch: The Science and Beauty of Medical Illustration at Mayo Clinic*, represented the affinity of science and art in understanding the human condition.



One breath at a time

New technology allows targeted view of lung lesions

For Stephanie Carlson, M.D., the problem was a moving target, literally. Each time she or a colleague in diagnostic and interventional radiology attempted to get a closer look at a suspicious spot on a lung, it would dart just out of reach. The elusive spot was always a tad too high or a smidge too low. And with each breath the patient took, the targeted spot would move again.

“It’s very difficult to conduct CT scans or needle biopsies because of the nature of the respiratory system,” says Dr. Carlson. “When you breathe, your lungs and the structures within them move, making it difficult to get an accurate look at or take a tissue sample from a suspicious lesion. It’s even more difficult if that lesion is very small or in a difficult-to-reach location.”

The Interactive Breath-Hold Control System has significant advantages for the patient including:

- Increased care and comfort
- Increased safety
- Decreased procedure time
- Decreased risk of complications
- Increased accuracy
- Reduced amount of radiation exposure



Stephanie Carlson, M.D.

Hopefully, in the not-too-distant future, patients worldwide who must undergo lung biopsy procedures will breathe a little easier thanks to Dr. Carlson's vision and a great collaborative effort among clinicians, physicists and engineers at Mayo Clinic.

In something resembling an interactive video game, patients strap a bellows-based belt around their rib cage. Once in place, the belt and the patient, both of which are connected to a lighted display, are ready to begin the procedure.



Video gaming, diagnostic style

Although she and her colleagues are trained to anticipate minute lung movements, Dr. Carlson knew there had to be a better way. So she called upon the expertise of Joel Felmlee, Ph.D., a medical physicist at Mayo Clinic Rochester, to help her find that better way.

The answer was as easy as asking patients to hold their breath in a measured manner. With the help of a lighted video game-like panel, created by Dr. Felmlee and Mayo Clinic engineers, Dr. Carlson devised a solution: the Interactive Breath-Hold Control (IBC) System.

In something resembling an interactive video game, patients strap a bellows-based belt around their rib cage. Once in place, the belt and the patient are connected to a lighted display and ready to begin the procedure. The patient then lies on the exam table and spends the next several minutes measuring breaths in an attempt to light the appropriate number of dots on the panel. Too shallow a breath and the series of dots won't climb high enough to reach the indicated marker. Too deep a breath and the lighted dots shoot past their target. The winner in this makeshift video game is the patient.

It's all good

The Interactive Breath-Hold Control System serves many purposes: it allows the examiner to conduct a more accurate and safer procedure in less time without losing track of the targeted area; it reduces the amount of radiation exposure

for the patient; it reduces the number of needle puncture attempts if a tissue sample is needed; and it decreases patient anxiety levels because patients are focused on lighting the panel. "By focusing on the display, patients can easily adjust their breathing and consistently reproduce the same reference breath-hold level," says Dr. Carlson.

And this is just part of the good news. Because of the improved accuracy of needle biopsy with the IBC System, fewer patients need to have an invasive surgical biopsy for diagnosis. Now these lesions can be viewed and sampled the same day, and patients can leave with nothing more than a Band-Aid as evidence of their experience.

Sharing and caring

The IBC System is now being used often at Mayo Clinic to view and biopsy suspicious lung lesions. And the good news is spreading. The Interactive Breath-Hold Control System has received approval from the Food and Drug Administration and has been patented so additional systems can now be built and distributed to other institutions for improved patient care. The IBC also is being studied for its potential use on other organs such as the liver, kidneys and pancreas — organs that also can be affected by the movement of respiration.

Hopefully, in the not-too-distant future, patients worldwide who must undergo lung biopsy procedures will breathe a little easier thanks to Dr. Carlson's vision and a great collaborative effort among clinicians, physicists and engineers at Mayo Clinic. ■

Stopping cancer spread

A glue-like molecule may fight metastasis

Ten years ago, when Panos Anastasiadis, Ph.D., began investigating a mysterious protein for its connection to cancer, he had little more than intuition guiding him. Scientists knew that the protein p120 had a role in holding cells together, but its cancer connection wasn't as clear.

Dr. Anastasiadis, however, believed p120 was an important player in cancer, and he knew one way to find out more about the protein: inject too much of it into a cell to see what would happen. When he did, something incredible unfolded. Cells became unnaturally elongated and elastic, with tendrils like jellyfish. It was a watershed moment for Dr. Anastasiadis, because his experiment proved that p120 helped regulate a cell's structure, shape and ability to move.

Because of that experiment and the work it has subsequently inspired, researchers know that p120 is a key factor in tissue remodeling, including wound healing. But conversely, it also plays a role in the deadliest phase of cancer, metastasis, when tumor cells spread throughout the body.

Metastatic cancer accounts for the majority of cancer deaths each year in the United States. In September 2006, Dr. Anastasiadis published research showing that p120 is involved in the earliest stages of metastasis.

The protein has a "two-faced" role in cancer. When cancer begins, p120 actually helps keep cells together and prevents them from spreading. But as cancer progresses, several changes occur, including the loss of some companion proteins that work with p120 to hold cells in place. As a result, p120 searches for and connects to new partners, setting off a series of events that allow cancerous cells to break off from tumors and spread throughout the body.

"Cancer takes advantage of the wound-healing properties in p120, which involves cells moving to a spot and then re-establishing themselves as they would during the healing process," Dr. Anastasiadis says.

However, Dr. Anastasiadis' research shows that p120's influence on cancer can be interrupted to stop cells from moving. Researchers have accomplished this feat in cell culture models, using viruses to reprogram cells, returning p120 to its normal function. Although these early results are far from achieving success in a patient with metastatic disease, Dr. Anastasiadis says, they demonstrate that p120 is a valid target for developing treatments.

It may be a powerful target, too, say Dr. Anastasiadis and colleagues, who believe that p120's role in metastasis is universal to all cancers that involve epithelial cells. These cells line the inside and outside of the body, as well as all organs. Nearly 85 percent of all cancers are epithelial.

"What we hope to do is find a drug that stops p120's metastatic function but not its ability to hold normal cells together," Dr. Anastasiadis says. "This is one of the real strengths of Mayo Clinic — translational research, or the ability to take a basic science discovery all the way to the patient. It's one of the major reasons I came here."

The bench-to-bedside connection

Mayo Clinic excels at translational research because of its emphasis on collaboration, which increases opportunities for physicians and scientists to partner in research. The numerous applications for Dr. Anastasiadis' research also encourage collaboration, and he is working with Mayo teams studying cancers of the kidney, lung, breast and brain.

Ten years ago, when Panos Anastasiadis, Ph.D., began investigating a mysterious protein for its connection to cancer, he had little more than intuition guiding him. Scientists knew that the protein p120 had a role in holding cells together, but its cancer connection wasn't as clear.



Panos Anastasiadis, Ph.D.

In particular, participation in the brain cancer group is a return home, of sorts, for Dr. Anastasiadis, having begun his research career in neuroscience. And his early training is highly relevant to his current work because during metastasis, some cancers spread first to the brain. This Mayo collaboration may bring benefit to patients because it will create more opportunities to participate in clinical trials that will test new therapies, says Kurt Jaeckle, M.D., a neuro-oncologist at Mayo Clinic Jacksonville.

“Clinical trials must include a basic science research component, so that we understand the mechanisms of treatment, and the scientific reasons for our successes and failures,” says Dr. Jaeckle, who heads the brain cancer research program at Jacksonville and for the North Central Cancer Treatment Group, a National Cancer Institute (NCI)-supported cooperative group based at Mayo Clinic Rochester, which includes other centers in the Midwest. “With Dr. Anastasiadis’ expertise, we’ll be able to better understand why some drugs are more successful than others. That will make us a more attractive candidate for clinical trials testing NCI’s latest therapies and will give us the opportunity to offer these therapies to appropriate patients.”

The Jacksonville group also is collaborating with teams at Mayo Clinic Rochester, which is home to a pre-eminent

program in brain cancer research. The Rochester program is one of a handful in the country to receive a Specialized Program of Research Excellence (SPORE) grant for brain cancer research from the National Institutes of Health.

The SPORE funding covers five years and is designed to foster translational research and produce discoveries that improve patient care within the grant’s lifetime. At the Rochester campus, the SPORE funding supports a four-part study of adult gliomas, the most common cancer of the brain and spinal cord. The funding also allows Dr. Anastasiadis to study p120 as a prognostic marker of glioma aggressiveness and as a target for new treatments.

Results are still to come from these efforts, but Dr. Jaeckle says benefits will come quickly because translational research is not a one-way process, but a multidirectional experience with widespread benefits.

“The clinical trials and the SPORE program are win-wins for everyone because the scientists and physicians generate new ideas from these experiences,” Dr. Jaeckle says. “It’s going to make our research stronger, which will ultimately improve the care that we give to patients.” ■

Director, Robert Rizza, M.D., (left) and Associate Director, David Warner, M.D., (right) of the Center for Translational Science Activities at Mayo Clinic Rochester.



REVVING UP RESEARCH

By Michelle Felten

Last decade's research is today's treatment and today's research could be tomorrow's cure.

For Robert Rizza, M.D., and David Warner, M.D., this sentiment is much more than a clever play on words, it's the driving force behind everything they do. As director and associate director, respectively, of the Center for Translational Science Activities (CTSA) at Mayo Clinic Rochester, Drs. Rizza and Warner have long championed the notion of accelerating research to improve patient care. And now they have partnered with the National Institutes of Health (NIH) in this effort. The NIH recently awarded Mayo a \$72.5 million grant to expand CTSA offerings. Mayo's part of the bargain will include raising \$45 million over the next five years to combine financial forces to fast-forward research.

Leading the pack

Mayo Clinic was one of 12 institutions to receive such funding from the NIH. The theory behind this widely cast net is that these 12 institutions will work together to expedite nationwide research efforts so that discoveries can make their way to patients' bedsides much more quickly than in the past. The process is known as translational research. As a charter member of this nationwide effort, Mayo Clinic will help shape the national health care agenda and establish standards and best practices for clinical and translational research and education for years to come.

"It's crucial that Mayo has a seat at this very important table," says Dr. Rizza. "In fact, we don't just want a seat at the table, we want to be at the head of the table. Traditionally, the bar Mayo sets for standard of care is very high, because we believe our patients deserve this level of care. Therefore, it's imperative that we help set the criteria."

The not-so-starting gate

In hindsight, Mayo's receipt of this grant was no accident. The prep work that generally goes into applying for grants of this size actually started long ago, about 100 years to be exact. Criteria for the NIH grant required areas of proven teamwork and collaboration with an emphasis on clinical and patient-oriented research. Thanks to Mayo's founders, Drs. Will and Charlie Mayo, these criteria have been in place for a century, making it easy for Drs. Rizza and Warner to theoretically check all the "yes" boxes on the NIH grant application form.

"I think one of the primary reasons we received this award is because the NIH was asking us to do things that we're already doing," says Dr. Warner. "We have always strived to translate research into better ways of caring for our patients. So for us it wasn't a matter of changing direction, it was a validation of the way we've been practicing for years."

"It's the way it's always been at Mayo," says Dr. Rizza. Doctors work with scientists who work with colleagues who evaluate findings to see if those findings help patients get better. Everybody works together to find the answer."

"In fact, even before news of this grant came out, we had plans in place to build on our existing research programs," says Dr. Warner. "Even before we were aware of an NIH program to accelerate translational research, we were working on ways to improve our translational processes. We were already asking ourselves 'how can

we improve our ability to turn research discoveries into safe and effective treatments for our patients?' We have a tremendous advantage at Mayo, because we already have a unified administrative structure. We don't have the walls and barriers between departments that other institutions sometimes have."


So with all the coordination elements already squarely in place, Drs. Rizza and Warner can focus their efforts on the best ways to implement the NIH grant as well as on the best ways to garner Mayo's part of the partnership: the additional \$45 million still needed.

A look under the CTSA hood

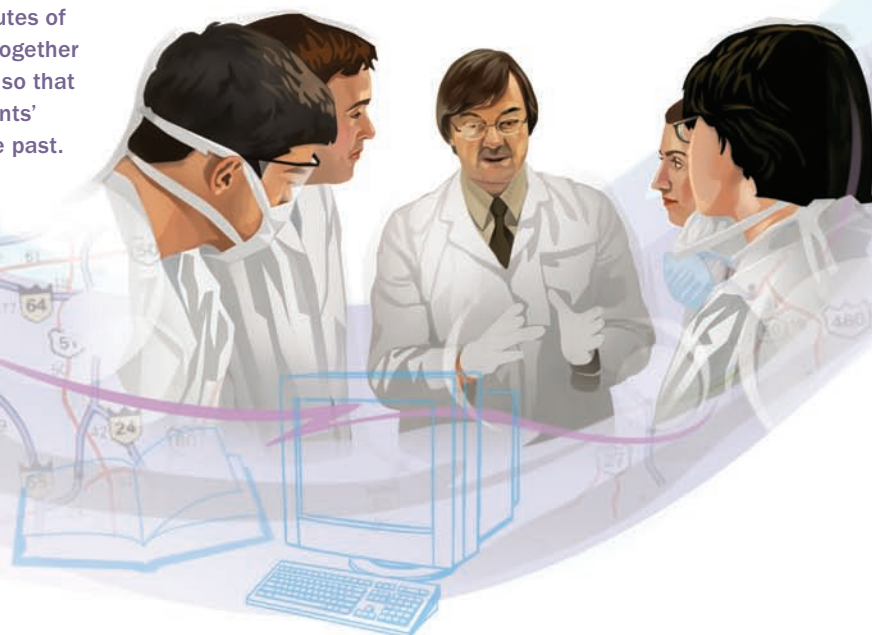
A bulk of the NIH grant will be used to further build the four components that fall under the Center for Translational Science Activities program. Those components are education resources, research resources, service center and community engagement.

Drs. Rizza and Warner use car analogies to explain their programs.

The education resources component of the CTSA is headed by Sherine Gabriel, M.D., and can be described in driver's-ed language. Before you can go anywhere, you have to teach people to drive. "You have to advance the people who will advance the science," says Dr. Gabriel. Given that, the goal of the education resources section is to train health



Mayo was one of 12 institutions to receive special funding from the National Institutes of Health. These 12 institutions will work together to expedite nationwide research efforts so that discoveries can make their way to patients' bedsides much more quickly than in the past.



“Traditionally, the bar Mayo sets for standard of care is very high, because we believe our patients deserve this level of care. Therefore, it’s imperative that we help set the criteria.”

– Robert Rizza, M.D.

Director of the Center for Translational Science Activities



If the medicine of tomorrow relies on the research discoveries of today, then Mayo is stepping up to lead the medical world in this journey. This is a journey that will transform the way medicine is practiced for generations to come.

professionals in new programs dedicated to translating research quickly into people’s lives. Research in the 20th century was focused on discovery while research in the 21st century will be focused on translation. The next generation of researchers needs to know how to “drive” in this environment.

Once researchers have a good sense of the roadways, Drs. Rizza and Warner say the CTSA next supplies them with a great car to drive. To conduct the best possible research, scientists need a top-notch ride, so the research resources component of the CTSA issues Vipers instead of Vegas.

The research resources area of the CTSA is directed by K. Sreekumaran Nair, M.D. “The idea is to first train researchers and then to give them the best facilities we can to do their work,” says Dr. Nair. “One example of this kind of state-of-the-art facility is the Clinical Research Unit. This unit provides advanced technology facilities for clinical researchers. Without the proper facilities, the physician-scientist who both sees patients and conducts research could become an endangered species. This facility is committed to helping researchers by expanding our excellence in clinical research. One initiative under consideration is the creation of a fully functional mobile clinical research van that can be sent out in the community to reach even more people.”

Once researchers are trained and have their Vipers selected, the next leg of the journey is to offer them great roads to travel on. This is where the service center component

The goal is to centralize information and streamline processes so researchers will spend more time in their labs and with patients, and less time on paperwork.

of the CTSA comes in. With the NIH grant, Mayo intends to upgrade from well-maintained highways to the “infobahn,” Mayo’s analogy to the Autobahn, Germany’s high-speed travel network. The goal of the service center is to centralize information and streamline processes so researchers will spend more time in their labs and with their patients, and less time on paperwork.

Michael Joyner, M.D., who heads this component of the CTSA says, “Right now, medical discovery is slowed by rutted roads filled with potholes. With the help of the NIH grant, we’re not going to patch potholes, we’re going to build an Autobahn for researchers so they can spend most of their time doing what they do best: research, not paperwork.”

So with high-speed roadways built, great cars to drive and experienced drivers at the wheel, the only part missing is the traveling companions. The CTSA’s version of a road trip is filled by the community engagement group, headed by Dr. Warner himself.

“Because the true test of any medical discovery is its usefulness and effectiveness in the real world, the community engagement group is focused on using the network of Mayo Clinic practices in surrounding communities to test the feasibility of implementing medical discoveries in community settings,” says Dr. Warner. “The ultimate goal of the CTSA is to serve surrounding communities, particularly medically underserved communities, through the community engagement program.”

Backing a winner

So with the education resources, research resources, service center and community engagement components of the CTSA in place, Drs. Rizza and Warner can now turn their attention to raising the remainder of the needed funds to further build these programs and speed translational research.

“With benefactor support, we could build an integrated health care organization across Wisconsin, Illinois and Iowa to make sure we had the best medical services possible in the upper Midwest. We could create the ideal infrastructure to treat our patients and train the scientists of the future,” says Dr. Rizza.

If the medicine of tomorrow relies on the research discoveries of today, then Mayo is stepping up to lead the medical world in this journey. This is a journey that will transform the way medicine is practiced for generations to come. ■

For information about the Center for Translational Science Activities, please visit www.mayoresearch.mayo.edu/mayo/research/cpor/

By Laurie Simon

Partnering for a purpose

Mayo Clinic and the Indian Health Service

Last year, Judith S. Kaur, M.D., an oncologist at Mayo Clinic Rochester, and a multidisciplinary leadership group spearheaded efforts for Mayo to enter into an agreement with the Indian Health Service (IHS) to provide better health care to underserved Indian populations. Today, the two organizations are combining efforts to reduce health burdens in American Indian and Alaska Native (AI/AN) communities.

American Indians and Alaska Natives in the United States have long experienced lower health status, lower life expectancy and a disproportionate disease burden. Tribal communities have the highest prevalence of type 2 diabetes in the world and lag far behind in access to quality health care. According to Dr. Kaur, the primary contributors to the rise of type 2 diabetes in this population are obesity, poor access to healthy foods and a lack of diabetes education.

Joining forces

Prevention, education and improved treatment of diseases such as diabetes are priorities for the IHS, the agency within the Department of Health and Human Services responsible for providing federal health services to American Indians and Alaska Natives. Mayo Clinic and the IHS will collaborate to reduce health burdens in these communities. According to Dr. Kaur, both Mayo Clinic and members of Indian tribes throughout the United States will benefit.

“With this program, Mayo and the Indian Health Service move from organizations that provide care to organizations that also help prevent disease for AI/AN populations,” says Dr. Kaur. “We’re able to incorporate practice, education and research into the relationship.”

A career of caring

For Dr. Kaur, this collaboration carries on her efforts in conducting research and education to improve patient care among American Indians. As medical director for the Native American Programs of the Mayo Clinic Cancer Center and as one of two American Indian oncologists in the United States, Dr. Kaur has worked to generate an enhanced level of health care awareness within this underserved population.

Varied and significant, the needs of AI/AN communities offer an important opportunity for Mayo to initiate improvements. Dr. Kaur’s aspiration of developing future health care leaders will come to fruition as the program is able to provide mentorship and support to young scholars.

Growing future health care leaders

“One of our students, Siobhan Wescott, worked as an educator in her Alaska community. She ultimately decided to go to medical school,” says Dr. Kaur. “She graduated from Harvard this spring and received a Hampton Scholarship



Dr. Kaur visits with Patricia J. Clark, M.D. (center) and M.D./Ph.D student Belinda K. Galeano (right)



Judith S. Kaur, M.D.

through a Mayo program. Her goal is to become a pediatric oncologist. Siobhan is a wonderful example of how support, inspiration and infrastructure works.”

Ms. Wescott, in turn, feels the continuing work of Dr. Kaur — combined with the inception of a Mayo Clinic/IHS collaboration — can make a great difference in the health and lives of Alaska Natives. Ms. Wescott says that the types of diseases that pose the greatest threats to the Alaska Native population have changed. “Two generations ago, infectious diseases were a big health problem,” she says. “TB [tuberculosis] was all over Alaska in the 1940s — thousands of people, including my aunts and uncles, were quarantined, and many died. Today, chronic diseases such as cancer, diabetes and heart disease are the most significant health problems.”

When Alaska Natives receive a diagnosis such as cancer, and have to go outside their usual health care system, it’s difficult, says Ms. Wescott. “The partnering of Mayo and IHS ensures that when there are questions, there is access to Mayo doctors at all three sites who can contribute answers.”

Collaboration across three sites

Although the IHS-Mayo partnership was drafted and signed at Mayo Clinic Rochester, it applies equally to Mayo Clinic Arizona and Mayo Clinic Jacksonville.

Dr. Kaur is optimistic about identifying allied health staff and doctors from each Mayo site who will share her passion for improving the health care of AI/AN populations. “We do have supporters who have worked with us at all three sites,” says Dr. Kaur. “The goal of the programs we’re creating is to include the full range of health care and to increase their success by developing strong ties to these communities.”

As the collaboration blossoms, Mayo is increasing the possibility that more AI/AN individuals will seek education and care at Mayo Clinic. The combined efforts taking place will provide Mayo opportunities to continue its commitment to better care for underserved populations.

To begin the partnership, work is occurring jointly through identification of implementation leaders in areas of cost-effective and preventive health care, education, research, career opportunities and grant funding.

Unique in its comprehensiveness

Dr. Kaur describes the IHS/Mayo Clinic collaboration as “unique in its comprehensiveness” because it will involve conversations among individuals across many subspecialties at Mayo. “As we talked and considered all chronic issues [experienced by these communities], we discovered we were looking for a comprehensive approach,” Dr. Kaur explains. “Now discussions are taking place across all subspecialties.”

Mayo Clinic’s comprehensive approach and unique system make it the ideal place for such an initiative to begin, and leadership from dedicated individuals such as Dr. Kaur is key to its success. “The Mayo system has helped Dr. Kaur and her programs thrive,” says Ms. Wescott. “She has been allowed to grow and be part of a system where she is not fighting for survival. She is allowed to make important connections and establish programs.”

As this program continues to evolve and Mayo fuses a powerful working relationship with the IHS, Dr. Kaur notes important short-term goals to establish a clear communication structure, and build trustful relationships through opportunities.

“We are striving to evolve health care for AI/AN individuals that encompasses the idea of prevention and extends Mayo’s mission to serve underserved populations. That is the ultimate vision of this groundbreaking collaboration,” says Dr. Kaur. ■

For information about Native American programs, please visit www.mayoresearch.mayo.edu/mayo/research/cancercenter/native.cfm

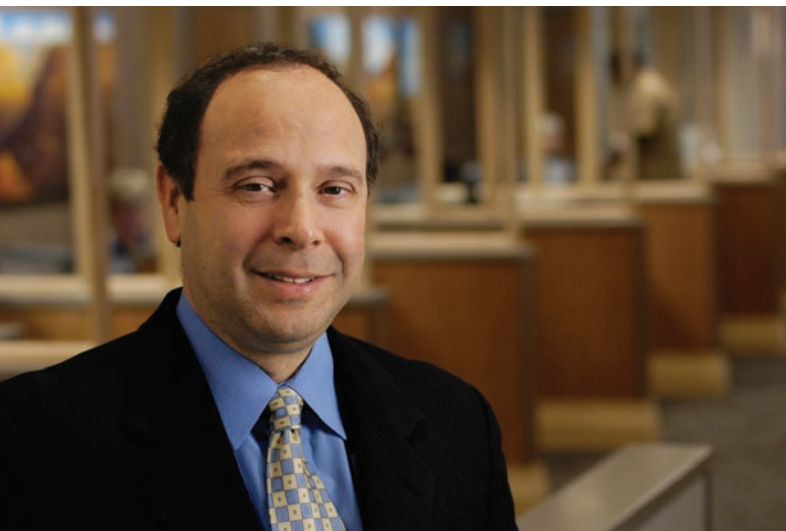
By Suzanne Winckler

The heart mechanic

When it's time for a change of heart

Francisco Arabia, M.D., was a mechanical engineer before he was a surgeon. He envisioned a career in the automotive industry until he took a human physiology class taught from an engineering standpoint. His path veered to medical school, where he chose to dedicate his life to that amazing machine, the heart.

Dr. Arabia is surgical director of the new Heart Transplant Program at Mayo Clinic Arizona. Even though Phoenix is the sixth largest city in the country, prior to Mayo's program, people living there had to go elsewhere for a heart transplant. Unfortunately, many did not survive their journey.



Francisco Arabia, M.D.

Dr. Arabia is surgical director of the new Heart Transplant Program at Mayo Clinic Arizona.

The Mayo Clinic Arizona team performed its first heart transplant in October 2005 and by the spring of 2007 had completed 21 heart transplants. Diane Kasper, heart transplant coordinator, emphasizes the word "team." Approximately 75 people play a role each time a patient receives a new heart. The staff not only helps the patient, but also assists the family through the arduous and often emotional process.

"I'm amazed by the teamwork from every area at Mayo Clinic — from the infectious diseases group to the financial department," says Ms. Kasper. "Everybody works to ensure the best outcome for the patient."

Heart boost

Candidates for a heart transplant frequently receive an implanted mechanical cardiac assist device. Called a "bridge to transplant," the device sustains the patient while he or she waits for a donor organ, and it often contributes to the patient's overall health prior to transplant surgery.

Dr. Arabia is an expert on cardiac assist devices, as is the Heart Transplant Program's medical director, Robert L. Scott, M.D. Their dual expertise in cardiac assist devices is one of the outstanding strengths of the new program.

The design of cardiac assist devices is a key chapter in the constantly evolving history of heart transplantation and of corresponding efforts to develop an artificial heart. "In the 1960s, the United States had two goals — to put a man on the moon and to design an artificial heart," says Dr. Arabia. "Developing the artificial heart became much more complex than people had anticipated, so efforts shifted to designing devices that could be surgically implanted to assist the heart until the patient recovered or received a donor heart."

The Thoratec HeartMate II is implanted in the chest to assist the heart. It can be used as therapy for a wide range of cardiac problems including for patients awaiting transplant. Using magnets to drive a turbine, the cardiac assist device provides a continuous flow of blood. The HeartMate II, which fits in the palm of the hand, is smaller and quieter than previous devices.



Cardiac assist devices started as large, cumbersome and noisy pumps. “When you walk into the room of a patient with a first- or second-generation device, it sounds like there’s a horse galloping in the room,” explains Dr. Arabia, who is on the forefront of driving the cardiac assist devices toward more streamlined, quieter design.

Mayo is currently participating in a large clinical trial of the latest-generation cardiac assist device, called the Thoratec HeartMate II. It’s one-third the size of previous devices, and rather than mimicking the pumping action of the heart, it creates continuous blood flow through the organ.

“There’s a turbine inside the HeartMate II that looks like a jet engine,” says Dr. Arabia. “A system of internal and external magnets keeps the turbine quietly spinning. There are no noisy valves.”

The clinical trial includes 35 medical institutions across the country. It will help determine the safety and efficacy of the Thoratec HeartMate II not only as a “bridge to transplant” but also as “destination therapy,” when a cardiac assist device is implanted permanently in patients whose cardiac condition, age or other medical condition precludes them from eligibility for heart transplant. Mayo Clinic Arizona is participating in the “bridge to transplant” phase of the clinical trial, while Mayo Clinic Rochester is part of the “destination therapy” portion.

Dr. Arabia is constantly thinking about the potential of mechanical engineering to improve the lives of cardiac patients. “This is what I live for,” he says. While he is very excited about the design advances of the Thoratec HeartMate II, he envisions the ultimate cardiac assist device, one which will be completely implanted in the patient with no external battery packs. “There is one in the design phase now,” he says.

Helping hands, helping devices

From the first days of the Mayo Clinic Heart Transplant Program in Arizona, Dr. Arabia and his colleagues made an effort to share their expertise in cardiac evaluation throughout the medical community in Phoenix. They formed a special rapid-response group known as the Mayo Clinic Cardiac Transport Team.

At the invitation of physicians and their hospitals, the Mayo team makes emergency evaluations of severely compromised cardiac patients and often will implant cardiac assist devices on site to stabilize patients until follow-up care can be determined. This care can range from the patient’s complete recovery to performing bypass surgery to putting him or her on a waiting list for heart transplantation.

The members on the rapid-response team usually include a cardiac surgeon, heart failure cardiologist, intensive care unit (ICU) nurses, surgical techs, nurse practitioner, physician assistant and a perfusionist who operates the heart-lung machine to maintain the patient’s blood flow. In its first year, the Mayo Clinic Transport Team received a dozen calls and went out on eight.

“Typically, a physician will call saying, ‘I need your team here now,’” says Ms. Kasper. “I put the physician through to Dr. Arabia, who discusses the patient’s issues and determines if we need to go. We then engage our team and get them to the patient as soon as possible. It’s an incredible opportunity to provide urgent care, and the cooperation between Mayo Clinic and other hospitals in Phoenix has been phenomenal.” ■

By Matt Derechin

Sensitivity training

More-sensitive blood test improves thyroid cancer care

Heightedened sensitivity can be a provocative topic of conversation. It's no different in thyroid cancer care, where researchers are finding that a newer, more-sensitive blood test suggests re-evaluating commonly accepted guidelines for long-term care of patients.

Earlier this year, researchers from Mayo Clinic estimated that physicians can save their patients thousands of dollars and significant time each year simply by using a more-sensitive blood test to measure thyroglobulin, a protein secreted by thyroid cells.

The newer, more-sensitive test helps produce these savings because physicians can use it to exclude or identify recurrence in patients who are at very low risk of thyroid cancer recurrence after successful treatment. Patients who are at low risk can forego an expensive and time-consuming

test, which is now part of the follow-up regimen prescribed for thyroid cancer patients, says Robert Smallridge, M.D., an endocrinologist at Mayo Clinic Jacksonville and the study's lead author.

"In our study, we had 80 patients who fell into this very low-risk category, and so far, the cancer hasn't returned in any of them," says Dr. Smallridge. "We'll have to continue following these patients and collecting data, but these results allow us to give patients much more reassurance, compared to the data that exists for less-sensitive thyroglobulin tests."

A new standard for undetectable

Detecting disease recurrence is complicated, particularly in differentiated thyroid cancer, which accounts for 90 percent of all cases nationwide. The standard treatment — removal of the thyroid gland, followed by application of radioactive iodine — puts the disease into remission in about 90 percent of all patients with differentiated thyroid cancer. But in about 10 percent of cases, the disease recurs, even after several years.

For that reason, thyroid cancer patients must undergo prolonged follow-up care, says Dr. Smallridge. Measuring thyroglobulin is one way to determine if a patient has any remaining thyroid cancer cells. But even this test can miss cancer recurrence in patients who have no detectable thyroglobulin levels.

That complexity has added significant costs and time to the annual follow-up care of thyroid cancer patients. To date, the best strategy for addressing this detection problem has been the use of recombinant human thyroid stimulating hormone (rhTSH), a drug that increases the activity of thyroid cells to make them easier to detect. But to use rhTSH for detection purposes, it must be injected twice, over a five-day period. The drug is costly and the injection schedule requires that patients come for repeat office visits and lab work.



Robert Smallridge, M.D.

Earlier this year, researchers from Mayo Clinic estimated that physicians can save their patients thousands of dollars and significant time each year simply by using a more-sensitive blood test to measure thyroglobulin, a protein secreted by thyroid cells.

“When you add the cost of the drug, the office visits and the related lab work, it’s well over \$1,000 and that’s a conservative figure using Medicare reimbursement rates,” Dr. Smallridge says.

But the Mayo group believes this costly regimen can change for some patients because it was initially devised to compensate for less-sensitive thyroglobulin tests, which are still widely used. In fact, the current regimen for thyroid cancer follow-up testing is based on data obtained from thyroglobulin tests that are up to 10 times less sensitive than the test now being evaluated by the Mayo group.

Test sensitivity appears to be a key difference, according to the Mayo Clinic study. The group followed 200 patients over five years. The 80 patients they identified as low risk had thyroglobulin levels too low even for this newer test to detect. In addition to seeing no cancer recurrence in this group, researchers also reported that rhTSH did not produce a response in 98 percent of the patients in this category.

“The newer test sets a new definition for undetectable thyroglobulin levels,” says Vahab Fatourehchi, M.D., an endocrinologist at Mayo Clinic Rochester who collaborated with Dr. Smallridge. “More studies will have to be done to confirm our results, but they point to something that will significantly change the way we manage some patients. Skipping rhTSH will save these patients time and money each year.”

Collaboration is key

Drs. Smallridge and Fatourehchi say that having two Mayo campuses participate in this research is an advantage. After Dr. Smallridge tabulated the data for patients in Jacksonville, he contacted Dr. Fatourehchi, who had begun a similar study years before. Dr. Fatourehchi examined results from his patients, and the two centers confirmed their findings.



Stefan Grebe, M.D., and Vahab Fatourehchi, M.D.

Mayo’s Endocrine Laboratory was also a key contributor. A facility that performs about 800,000 tests annually and helps develop 10 to 20 new tests a year, the lab is co-directed by Stefan Grebe, M.D. The laboratory has had an important role in developing the more-sensitive thyroglobulin test, performing in collaboration with the manufacturer validation studies that were necessary for the test to receive Food and Drug Administration approval.

Although Dr. Grebe is no longer on the patient floor, his mind is never far from it. “What it’s all about for us is the care of the patient,” says Dr. Grebe. “In this case, it will hopefully become less expensive and less arduous for the patient.” ■



A stitch in time

Quilters Celebrate Mayo Clinic's 20th Anniversary in Arizona



By Suzanne Winckler

This June, Mayo Clinic Arizona began a yearlong celebration of its 20th anniversary by unveiling a very special 13-foot by 5-foot quilt that portrays Mayo Clinic taking root among the saguaro cactus, agaves and paloverde trees.



It was 110 degrees on June 29, 1987, when Mayo Clinic first opened its doors to patients in Arizona. Arizona's blast-furnace summers share one commonality with the deep-freeze winters of Minnesota — they're a test of fortitude. Mayo Clinic has proven just how hardy its mission is, whether it's planted in the prairies of southern Minnesota, the coastal regions of Florida or the low desert of Arizona.



That first summer day in Arizona, 42 physicians and 220 allied health personnel were on staff. A harbinger of Mayo Clinic's bright future was the fact that more than 1,800 people had made appointments — even before the doors opened. Twenty years later, 344 physicians and some 3,500 allied health staff provide care for an annual patient population of about 100,000.

The quilt is a visual feast. Seen from a distance, it pulses with color. From the shimmering sun to meandering desert path, it is alive with motion and intensity — two terms that also describe Mayo Clinic. Seen up close, the quilt is a wonderland of intricate details and three-dimensional shapes, from the handmade glass beads on the fruits of prickly pear cactus to the multiple fabric layers that make the saguaro and other cacti plump, as they are in nature. And the mountains are truly tectonic. "The mountains are made with fabrics that I scrunched and dyed

and pushed and pulled," says Denise Currier. "Then I used metallic thread and oil sticks that I melted into the fabric." While delighting the eye, all the tiny details collectively form a seamless, integrated whole, just as Mayo Clinic's attention to detail achieves a seamless, integrated clinical practice. And just as Mayo practices medicine by teamwork, this intricate work of art was also created by collaboration.

"The sun and sunsets along with the greens of the desert are such a part of Arizona. We really tried to represent the beautiful colors of the desert," says Ms. Currier, a multimedia artist who developed the design concept for the quilt and helped coordinate the quilters.

"The quilt tells a story within its stitches, but it's not really a historical piece," says C.J. Kennedy, site coordinator for Mayo Clinic Center for Humanities in Medicine. "It is an interpretation of our mission and points to the creative spirit of Mayo Clinic."

21st century quilting bee

Renee Caswell, M.D., is an anesthesiologist and quilter extraordinaire. She is participating in the quilting renaissance that's reviving this once-disappearing pioneer craft and moving it into realms of innovative fiber art. International quilt festivals often attract 50,000-plus people who are thinking outside the square, star and pinwheel, and Dr. Caswell is one of them.

Not surprisingly, a remark Dr. Caswell made after a committee meeting about Mayo Clinic Arizona's 20th anniversary set the creative gears in motion. "As we were walking out of the meeting, I said to some of my colleagues, 'We should make a quilt for the anniversary.'"

The quilt symbolizes the 20th anniversary of Mayo Clinic Arizona. The quilt is a



After countless hours of cutting, fabric dyeing, stitching and beading, a priceless metaphor for Mayo Clinic's first 20 years in Arizona was complete. Quilters include (left to right) Lisa Hamilton, Fran Breazeale, Denise Currier, Verna Roller, Renee Caswell, M.D., and Sue Roston.

Two years and countless hours of cutting, fabric dyeing, stitching, beading and appliquéing later, a team of six women completed a priceless metaphor for Mayo Clinic's first 20 years in Arizona.

Dr. Caswell and Ms. Currier, whose vast talents complement one another, led the project and the team's work. While Ms. Currier is not on staff at Mayo Clinic, she brought many Mayo-like skills to the task, including her ability to organize and motivate others. "For Denise, art is a process," says Ms. Kennedy. "There's no right or wrong way. She brings out the talent and creativity in people."

Quilter Fran Breazeale, a secretary supervisor in Operation Administration, did a lot of machine and hand embroidery, working on the background and making cacti, rocks and flowers.

Lisa Hamilton, a medical transcriptionist, is a jewelry maker who works with glass and enamel. She made the tiny enamel pieces and glass beads that adorn the quilt. "Copper

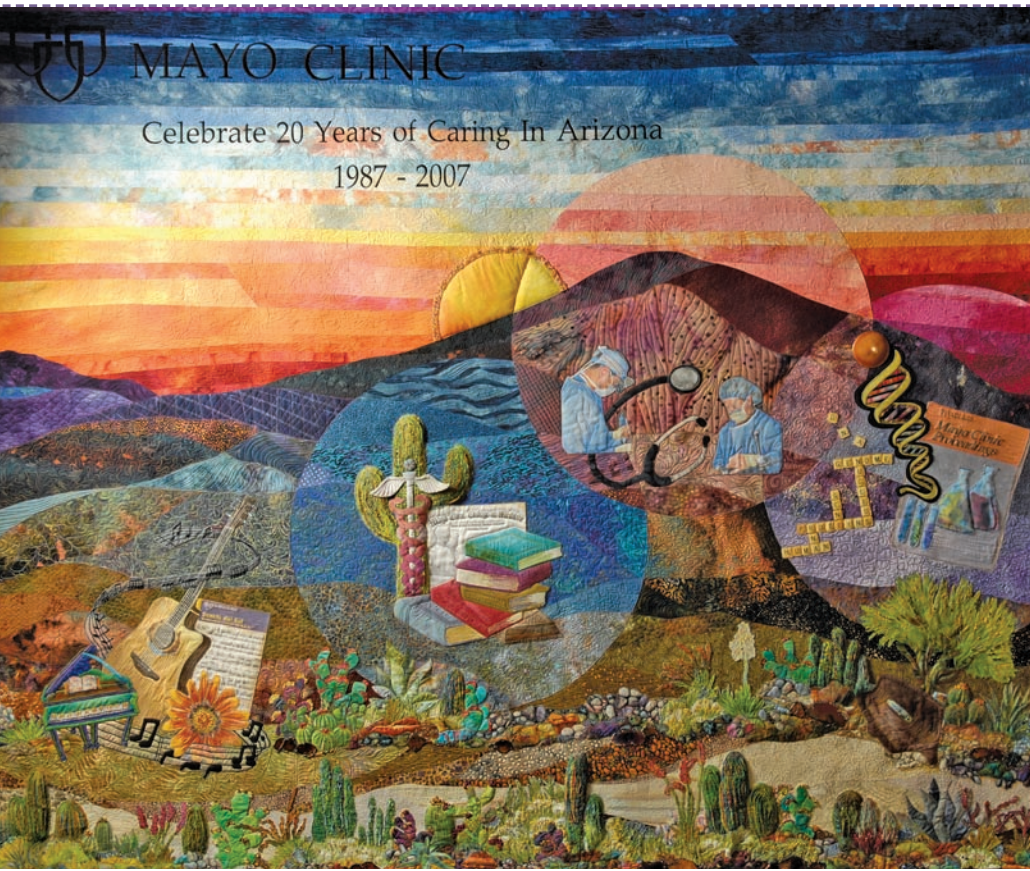
is endemic to Arizona, so I thought it would be great if we incorporated it into the quilt," she says. "When it's enameled, copper is so alive, it just glows."

Sue Roston, a nurse in clinical studies, describes herself as one of the project's worker bees. She did a lot of appliqué work, which involved detailed handwork to create the quilt's three-dimensional elements, from rocks to flowers.

The sixth quilter, Verna Roller, a medical education coordinator, helped make many small cacti, the stethoscope and she did a lot of beading work. "My favorite thing about this project was working with so many gifted individuals," she says. "This whole experience is one I will always cherish."

Among her many contributions to the quilt, Dr. Caswell did all the machine quilting and embroidered the Mayo Clinic logo onto the completed quilt. "I'd never done embroidery on that scale before. It almost put me over the top," she recalls. Dr. Caswell uses a long-arm quilting machine, which dominates one of the two rooms in her home dedicated to

testimony to the sense of friendship and community that grows from teamwork.



“The quilt tells a story within its stitches, but it’s not really a historical piece. It is an interpretation of our mission and points to the creative spirit of Mayo Clinic.”

— C.J. Kennedy

fiber-art projects. Maneuvering the large panels of fabric on the sewing machine resembles wrestling an octopus.

Dr. Caswell has been impressed by the collaboration and trust among the quilters working on the project. Appropriately, as an anesthesiologist, she counts on these two qualities every day from her Mayo Clinic colleagues. Depending on the phase of the project, the three panels of the quilt were passed back and forth between Ms. Currier’s and Dr. Caswell’s studios. “We each considered the quilt to be our baby, so we’ve built a lot of trust among ourselves,” says Dr. Caswell.

Honoring the past, building the future

Mayo Clinic and its mission are very prominent within the quilt’s Arizona desert backdrop. Circular motifs convey the continuity and permanence of Mayo’s mission and the circularity of past, present and future.

The three shields of Mayo Clinic are represented by three interlocking circles. Within each circle are images that evoke the shield — for Education, the intertwined serpents of the caduceus, which has been the symbol of the American medical profession for more than a century; for Patient Care, a stethoscope looping between two surgeons caring for a patient; and for Research, a double helix strand of DNA. The Center for Humanities in Medicine is represented by a piano, guitar, musical notes and a musical score.

The left and right panels contain very detailed renderings of the Mayo Clinic building on the Scottsdale campus and Mayo Clinic Hospital on the Phoenix campus. The Mayo Clinic Nature Trail extends across all three panels. “We incorporated the trail and bridge because they show the importance Mayo Clinic places on providing serene and calming places for patients and staff. The bridge also represents Mayo Clinic looking ahead. It symbolizes walking across the bridge to the future,” explains Ms. Currier.

Every detail of the quilt echoes Mayo Clinic’s attention to detail in the care of each and



In the two years they worked together, the team of quilters came to reflect on the many important aspects of Mayo Clinic and its mission. Their focus on every detail of the quilt — large and small — echoes Mayo Clinic's attention to detail in the care of each and every patient.



Denise Currier and Renee Caswell, M.D.

True friends, true colors

An integral part of Mayo Clinic's 20th anniversary in Arizona is celebrating friendship formed through teamwork. All pioneering projects create bonds of friendship among the people who work together to build a shared dream. In a very special way, the making of the quilt echoes the sense of friendship and community that grew among the founding staff, many of whom came south from Mayo Clinic's campus in Rochester, Minn., to carry Mayo's mission to Arizona. Quite a few of the pioneering generation are still on staff, and many emeritus staff and their families remain vital members of the Mayo family.

In the two years they worked together, the team of quilters came to reflect on the many important aspects of Mayo Clinic and its mission. Their focus on every detail of the quilt — large and small — echoes Mayo Clinic's attention to detail in the care of each and every patient. The quilt's creative design symbolizes Mayo Clinic's commitment to

innovation. Their teamwork is a hallmark of Mayo Clinic. Finally, the quilt celebrates the sense of friendship and community that grows from teamwork.

"I must say, this is one of the most fantastic projects I've ever worked on," says Ms. Currier, who sees most things in terms of color. "The true colors of people came out. Everyone was very devoted. They worked nights and weekends and took vacation time to focus on the quilt." ■

every patient. The creative design symbolizes Mayo Clinic's commitment to innovation.

Heart twists, not beats

Redefining how the heart functions

For years it was believed that the action of a pumping heart circulates the blood throughout the body. But Mayo Clinic cardiovascular researchers recently demonstrated that the heart doesn't simply pump or squeeze — it twists. Inside the heart's chamber, blood swirls and accelerates due to a synchronized twisting action similar to that of wringing out a wet towel. These findings open up a whole new arena of research in heart mechanics and call into question current methods of treating heart disease.

The mysterious squiggles

The motion of the heart has always intrigued Partho P. Sengupta, M.D., assistant professor of medicine at Mayo Clinic College of Medicine and lead author of research leading to the recent discovery about heart motion.

"It's a fascinating journey," says Dr. Sengupta, as he describes the path to this discovery.

The journey began in India, where Dr. Sengupta lived and practiced as a cardiologist in a university hospital. "There, we used echocardiography, or high-frequency sound waves called Doppler imaging, to study blood flow and the movement of the heart," he says.

"We saw squiggles or waves on the Doppler, but nobody had an explanation of how these waves were being generated," says Dr. Sengupta. "At that time, we couldn't explain how the heart muscle actually moved to create these waves."

In 2004, Dr. Sengupta was presenting research on the movement of heart muscle at an international conference in India. There, he met Bijoy K. Khandheria, M.D., now chair of the Division of Cardiology at Mayo Clinic Arizona.

"Dr. Khandheria showed interest in my research and extended an invitation to come to Mayo Clinic," says Dr. Sengupta. It meant not only leaving his home and giving up his cardiology practice in India, but also repeating his residency and cardiology fellowship in the United States.

"I did this for the opportunity to pursue an academic career and research at Mayo Clinic," Dr. Sengupta says.

Once at Mayo, Dr. Sengupta was introduced to Marek Belohlavek, M.D., Ph.D., ultrasound imaging specialist and professor of medicine and biomedical engineering. Dr. Belohlavek has received funding from the National Institutes of Health and American Heart Association and formed a group of researchers interested in the mechanics of the heart.

"This group really supported my interest in the motion of the heart. With this level of support and the fantastic infrastructure at Mayo Clinic, it was bound to be a boost to my research effort," says Dr. Sengupta.

Nature moves in swirls

"To understand how the heart moves, we needed a better understanding of the architecture of the heart that supports that function," says Dr. Sengupta.



Marek Belohlavek, M.D., Ph.D., and Bijoy K. Khandheria, M.D.



Partho P. Sengupta, M.D.

He did a simple experiment. He placed an animal heart in a chamber of water and scanned an ultrasound beam across it. “I saw the ultrasound reflections from the heart muscle swirling in two directions,” he says.

This indicated that the muscle fibers inside the heart were spiraling in two directions. The pattern was similar to the natural vortex seen in tornadoes, hurricanes or galaxies.

“This helical structure description was not new,” says Dr. Sengupta, “but somewhere in the course of trying to understand heart mechanics, this understanding of the heart’s form and function had been lost.”

He searched the literature for support of this concept and found a description of muscle fibers of the heart as a right- and left-handed helix. This explained the swirls going in opposite directions, but now he needed to prove that this structure was contributing to those twists and squiggles seen on the imaging of the heart’s motion.

To fully study the cardiac muscle movement, Dr. Belohlavek’s group used ultrasound crystals implanted in a specific pattern on the surface of an animal heart. This meshwork of crystals spoke to each other. When the heart moved, the whole meshwork moved and allowed detailed analyses of cardiac muscle motion.

The first breakthrough

Those Doppler squiggles that had mystified Dr. Sengupta enough to leave his home and come to Mayo Clinic were finally identified.

“The waves that we saw on the Doppler were actually supportive movements of this counter-directional helix — the twisting motion of the heart,” says Dr. Sengupta.

In 2004, Dr. Sengupta received the prestigious Young Investigator’s Award from the American Society of Echocardiography for this discovery. The team’s research findings were published in the September 2005 issue of the *Journal of Applied Physiology*. Studies that subsequently confirmed the link between the heart’s muscle action and the swirling blood flow motion were published in the Jan. 3, 2006 and Feb. 27, 2007 issues of the *Journal of the American College of Cardiology*. Dr. Sengupta received the Mayo Clinic 2007 Outstanding Research Award in recognition of his significant research accomplishments during his residency training.

A look at the future

“Redefining how the heart functions is one of the first steps that could lead to revolutionary approaches to treating patients with heart failure,” says Dr. Khandheria.

On the research journey to understand the beat of a heart, Mayo Clinic researchers also discovered how echocardiography might be used in a new way. They demonstrated for the first time that minute changes in the heart’s muscle occur and can be detected.

In the future, it may be possible to use echocardiography to identify early indicators of heart problems without the risk of an invasive procedure. Such an early warning system could allow physicians to intervene with appropriate therapies and prevent problems that could lead to heart attack or heart failure.

This research offers promise for eventually advancing the use of echocardiography from an imaging technique to a tool that improves our understanding of the heart’s physiology and events that are occurring even at the cellular and molecular level, says Dr. Belohlavek. “In this way, some forms of heart disease could be detected in very early stages or — better yet — prevented,” he says. ■

By Michelle Felten

Michael Brennan, M.D.

Associate Chair of the Department of Medicine

Michael Brennan, M.D., is a consultant in the Division of Endocrinology and Metabolism, associate chair of the Department of Medicine and associate medical director for the Department of Development. He also serves as chair of the Mayo Clinic Program on Professionalism and Bioethics.

In his capacity as leader of the Mayo Clinic Program on Professionalism and Bioethics, Dr. Brennan spends much of his time talking with medical students, allied health staff, colleagues, benefactors and community members about the art of medicine.

The art of medicine is a concept that was valued and advanced by Drs. Will and Charlie Mayo in their quest not only to attend to the medical needs of their patients, but also to impress upon their colleagues the value of compassion and empathy in treating the whole patient — mind, body and spirit. Their maxim, “The needs of the patient come first,” is the primary value that guides the Mayo Clinic practice.

Dr. Brennan’s charge is to advance the altruistic teachings of the Drs. Mayo by educating others on the art of medicine.

In this interview with *Mayo Magazine*, Dr. Brennan discusses his concepts, beliefs and teachings on this ideal of the practice of medicine.

Is there a simple way to describe the art of medicine?

A formal definition is elusive, but allow me to try. In my opinion, the art of medicine is a set of diverse skills that can be taught and learned, which enable physicians to apply the science of medicine to each patient. It stems from a desire to understand the true needs of the patient. This is the primary commitment of medical professionalism and is central to the healing process. This definition emphasizes that the key elements of the art of medicine can be learned and are in the best traditions of a profession based upon altruism.

One of the concepts behind the art of medicine is the ideal of treating the whole patient, not just attending to medical needs. Can you discuss this?

At the base of everything we do is our founders’ goal that the needs of the patient come first. This is a powerful statement first articulated by Dr. William Mayo close to a century ago. It is a lofty goal, but one we strive to accomplish every day. However, before we can do so, we must first understand what the patient’s true needs are. Being able to determine the nuances of these needs requires skills that are taught, learned and mastered at Mayo Clinic.

“Medicine is both an art and a science and both make appeal to the true physician.”

— Dr. Charles Mayo

In his capacity as leader of the Mayo Clinic Program on Professionalism and Bioethics, Dr. Brennan spends much of his time talking with medical students, allied health staff, colleagues, benefactors and community members about the art of medicine.



Michael Brennan, M.D.

Is the term “healing” a better way to describe what Mayo Clinic doctors and allied health staff do?

Yes. We realize that we can't heal through art or science alone. There is good evidence that the effectiveness of care, including patient compliance with treatment, is heavily dependent upon the ability of the doctor to generate patient trust and confidence. Trust and confidence are gained through the consistent expression of professional attributes that include excellence, accountability, empathy, reflective practice and superior communication skills. Mayo training programs focus not only on scientific and technical knowledge, but also on acquiring and honing the skills central to the art of medicine. It was the way our founders saw it, and it is the way we see it today.

Can you train someone to be empathetic?

I believe that there are many who by their very nature are empathetic. Thankfully, when you look at the qualities of medical students, they tend to be people who are idealistic and empathetic. At Mayo Clinic, we build upon that instinct through our curricula. Physician training includes both a formal and informal curriculum. The formal curriculum teaches the basic scientific knowledge of anatomy, physiology

and pathology that is requisite for physicians. Then there is the informal curriculum, which students learn by being around mentors, professors, peers and patients. Informal curriculum is what students pick up between formal lectures, like on-the-job training. This includes both structured and unstructured observation and is a crucial time of training. Here's an example of the type of observation we hope for ... Say, you have a medical student who is shadowing a professor. The student sees that the professor is kind and considerate with the patient, portraying a professional image, making sure the patient's needs are met and truly listening to the patient's concerns. At Mayo, we strive for top-notch professors, people who exude professionalism in their lives and in their work. We strive for people who will pass down the Mayo tradition of putting the patient's needs first.

How do we assure that medical students learn professionalism?

A number of complementary approaches are embedded in our teaching curricula. For example, the attributes of professionalism are included in the first-year medical student anatomy curriculum. This emphasizes the importance we place on professionalism long before students interact with



patients. Another program, called Safe Harbors, provides the opportunity for students to discuss their observations in an environment where they can speak openly. In this program, students talk about their experiences as they relate to observed professional behaviors of faculty and peers. They are asked what best exemplified professionalism, and alternatively, what they observed that left them feeling that the highest professional standards were not met. This program is a standard part of training. We also seek to measure the professionalism of Mayo learners. The methods used include both faculty and peer evaluations against a number of standard criteria. There's one wonderful question that's asked of each resident's peer group and that is 'Would you want this physician taking care of someone you love?' The answers they give are powerful and telling.

How does medical training at Mayo Clinic differ from training at other institutions?

Our entire culture has been built on the concept of teamwork, or as Dr. William Mayo put it the "union of forces," so we have a lot at stake in passing that down to the next generation of caregivers. Our culture is built upon a very rich heritage of success. We are in a position to be nationally recognized leaders in the art of medicine. But we can't take that for granted, which is why we are putting formal programs into place to assure that this style of practicing medicine continues to flourish. We seek to inculcate the attributes of professionalism in all who train at Mayo Clinic. Students are

taught teamwork as we already discussed; they are taught respect for the patient and their colleagues; and they are taught reflection. These are just some examples of how we bring professionalism into the equation as we train students in the artful manner of caring for patients. It is our intention to educate in a way that instills a lifelong pattern of empathy and caring.

Are there other ways Mayo is training medical students and allied health staff in the art of medicine?

I would say that our SIM Center (Multidisciplinary Simulation Center) is a wonderful way for people to learn the art of medicine. The SIM Center allows students to practice objective, structured, clinical examinations (OSCEs). These exercises can be done with actors or test patients. For example, we practice delivering bad news. Another exercise helps with expressing empathy, and still another gives would-be doctors practice in listening to what their patients are saying.

It is such a desire on the part of our society that we have caring physicians and nurses that professionalism is now one of six core competencies expected of medical residents before they can graduate from medical school and be board eligible to practice. It's that important.

We also have a Program in Professionalism and Bioethics at Mayo Clinic. This program champions and advocates professionalism for Mayo staff members at all stages of their careers, conducts original research into how profes-



sionalism is best taught and measured and gauges how these qualities improve outcomes of care. The program further raises awareness of professionalism and how it is nurtured throughout the continuum of a medical career. An early and highly successful initiative was the establishment of a doctor-patient communication program that further hones the skills of new staff consultants.

At Mayo, we are so fortunate to have loyal, talented and dedicated allied health staff. Every week, patients, families and friends express their appreciation for the care shown them by a Mayo staff member. An early initiative of the Professionalism Program was the establishment of P.L.E.A.S.E. C.A.R.E., a program that teaches empathetic caring to all allied health staff. This program is enormously popular and successful.

How do we assure that the art of medicine continues to be the standard of care at Mayo Clinic?

The best way to secure this concept is to continue to build resources to teach these attributes in the most effective ways. When you consider the number of people we train, about 1,700 a year, we realize that this is a big time commitment as well as a big resource commitment. Resources are needed to ensure faculty time and to train faculty members to carry forth our mission. We need to constantly evaluate our teaching models to assure that everyone who comes out of a Mayo training program has mastered both the science and the art of medicine. We believe that our patients, our learners, and, indeed, our society deserve nothing less. ■

“The art of medicine is a concept that was valued and advanced by Drs. Will and Charlie Mayo in their quest not only to attend to the medical needs of their patients, but also to impress upon their colleagues the value of compassion and empathy in treating the whole patient — mind, body and spirit.”

— Michael Brennan, M.D.

Annual Giving

Grateful patients, loyal benefactors

Mayo's Annual Giving Program not only assures that our patients have the best care available, it also assures that our physicians and allied health staff have the resources necessary to provide the quality care our patients expect and deserve. The reasons physicians choose to practice at Mayo Clinic are as varied as the reasons our benefactors choose to give. Whether your goal is to sustain the level of care Mayo is known for worldwide, to help advance medical research so that our physicians and our practice will continue to thrive, or to help educate the physicians of tomorrow, your annual gift works to help Mayo provide the best care to every patient every day.

For more information about our Annual Giving Program, call Jim Isaak at (507) 284-0970 or e-mail isaak.jim@mayo.edu



Adamarie Multari, M.D.

IN THEIR OWN WORDS:

Why doctors choose to practice
at Mayo Clinic

"Many physicians have stories of why they practice here. For me, it began with the illness of my mother. I'd heard about the world-famous Mayo Clinic, so I put her in the car and drove her here. The doctor she saw provided the most compassionate, respectful care I'd ever seen. At the time, I was entering medical school, and I thought to myself this is where I want to come and practice."

— Adamarie Multari, M.D.

Executive Health Program, Mayo Clinic Rochester

Stewardship report

The many ways you can support Mayo's mission

These stewardship pages highlight members of our recognition groups. Many benefactors belong to one or more of these groups to enhance their philanthropic experience.

Mayo Principal Benefactors

The designation of Principal Benefactor was established in 2003. It honors individuals and organizations who contribute \$1 million and more to support the mission of Mayo Clinic. We are honored to recognize an elite group that represents the foremost supporters of Mayo Clinic. By supporting innovation and discovery, these benefactors touch the lives of people throughout the United States and around the world.

Contact: James Hodge
hodge.james@mayo.edu

Mayo Major Benefactors

The designation of Major Benefactor was established in 1970. It honors individuals and organizations who contribute \$100,000 and more to support the mission of Mayo Clinic. These philanthropic gifts help Mayo Clinic provide the best care to every patient every day. They also support medical innovations that benefit people throughout the United States and around the world. The generosity of these gifts help Mayo uphold the tradition of its founders.

Contact: James Lyddy
lyddy.james@mayo.edu

Mayo Annual Giving Program

The Mayo Annual Giving Program was established in 2000. It is Mayo Clinic's newest membership organization and is the only annual giving group of programs offered at Mayo Clinic. Annual contributions ensure that Mayo will have the necessary resources to continue providing compassionate

care for our patients, advancing medical progress and educating future physicians. Members of this group can provide annual support at one of six giving levels ranging from our Mayo Friends level of \$1,000 a year, to our Mayo Leadership Circle level of up to \$99,999 in a calendar year.

Contact: Jim Isaak
isaak.jim@mayo.edu

The Mayo Legacy

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. There are no membership fees or required gift amounts to join The Mayo Legacy. Currently, more than 3,200 individuals belong to The Mayo Legacy. Members live in 50 states and 14 countries.

Contact: Laird Yock
yock.laird@mayo.edu

The Doctors Mayo Society

The designation of The Doctors Mayo Society was established to honor individuals who provide alumni financial support for Mayo programs. Gifts are given to perpetuate the excellence of medical practice, education and research at Mayo Clinic. This benefactor category is open to members of the Mayo Clinic Alumni Association, Mayo Clinic Administrative Voting Staff and public members of the Mayo Clinic Board of Trustees.

Mayo Alumni Laureates

The designation of Mayo Alumni Laureates was established to honor benefactors who are alumni of Mayo Graduate School, Mayo School of Graduate Medical Education or Mayo Medical School, as well as their spouses.

Contact: Robert Giere
giere.robert@mayo.edu

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

PRINCIPAL BENEFACTOR: **George L. Leef**

A legacy of family devotion

By Dianne M. Axen

When George L. Leef, 82, passed away on Jan. 13, 2007, it seemed a shining star had been extinguished and the world became a dimmer place. At his side during his final days was his loving family: Ruth, his wife of 57 years; their six children, George, Karen, Cathy, Jim, David and Ann; and several grandchildren.

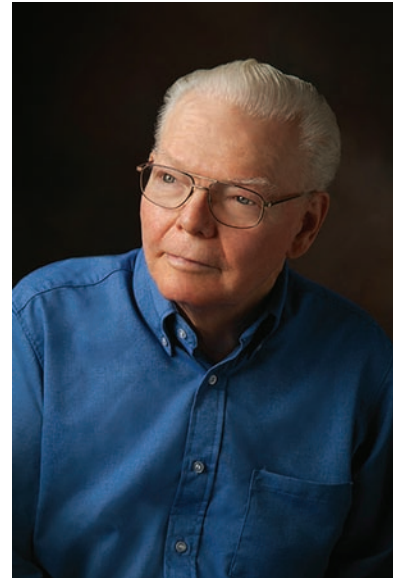
Mr. Leef cast his light not only for family and friends, but also on a brilliant business career. He successfully ran Industrial Towel & Uniform, a business founded by his father and uncle, for more than 30 years.

His life was not easy. Mr. Leef fought a lifelong battle with type 1 diabetes. At 5, he was one of the first children ever to receive insulin to manage the disease. So serious was his condition, he was tutored at home. There he had the opportunity to spend time with his father and learn the family business. He learned by doing and picked up practical skills in areas such as welding, plumbing, electrical and hydraulics. This provided him with a hands-on approach to managing business, which served him well throughout his life.

Mr. Leef never let his medical condition hold him back. As president of Industrial Towel & Uniform, he was a hardworking visionary. He ushered the company into electronic computing, among the first in the industry to do so. This, along with the installation of sophisticated equipment, carved

a unique niche for the company. Today, the family continues the same superior service using the newest technologies available to advance the company.

According to his family, diabetes did not deter him from enjoying an active sports life. As a teenager he played tennis. Later, he took up golf, which he always enjoyed regardless of his score. He played until the mid-1990s, when a stroke left him unable to play, but he remained fascinated with the game. And he loved watching the Green Bay Packers.



George L. Leef

For many years, the Leefs have supported Mayo Clinic research on diabetes and stroke prevention. Thanks to their vision and generous support, research holds the key to a brighter future for those still battling these conditions and new hope for the next generation.

Mr. Leef was a patient of Mayo Clinic for many years. But the Leef family history with Mayo began with Mr. Leef's mother, Claire, who was the first family member to become a patient. Later, Claire's daughter, Julie, Mr. Leef's sister, was treated for a brain tumor at Mayo. Sadly, she died at 14.

Throughout his career, first as a businessman and then as a philanthropist, Mr. Leef was at the forefront in supporting advances for future generations. His advice to his children as they assumed responsibility for the business was: "Think it through, and do what you think is best."

That same wisdom has influenced the couple's spirit of giving. For many years the Leefs have supported national diabetes research. They are Principal Benefactors of Mayo Clinic, supporting research in diabetes and stroke prevention. Through their vision and generous support, research holds the key to a brighter future for those still battling these conditions and new hope for the next generation. ■

ANNUAL GIVING PROGRAM: **Donna Hicken**

Running miles for research

By Matt Derechin

Every day of Donna Hicken's week is an endurance test that begins at 6:30 a.m., and runs until after midnight. Each day, she balances many passions: family, work as an evening news anchor, her charitable foundation and a fanatical devotion to running.

Her life is hectic, but it's one of many positives that have come from her battles with breast cancer. "I wouldn't want to go through that experience again, but it's made such a change in my life and, hopefully, through the work of my foundation, it's helping others," she says.

A three-time winner

Her first breast cancer diagnosis came as a shock. Aside from donating a kidney to her father, she'd never been to a hospital for "so much as a hangnail," she says. Her local doctor referred her to Mayo, saying "Everybody loves Edith Perez."

"We hit it off right away," she says. "I needed a lot of information to feel like I was in control. Dr. Perez spent three hours with me that first meeting, answering every question."

Her treatment went even better, saving her life twice. Chemotherapy knocked her cancer into remission, and during her treatment, her physicians discovered and repaired a brain aneurysm. She soon returned to her routine, but three years later, the cancer returned. Her prognosis was poor, but chemotherapy, radiation and surgery have seemingly eradicated the disease.



Donna Hicken

Giving back

Donna says surviving cancer heightened her sense of responsibility, which led her to establish her foundation in 2003.

The Donna Hicken Foundation provides financial help for underserved women with breast cancer. It also supports the Summer Undergraduate Research Fellowship (SURF) Program at Mayo Clinic Jacksonville. The SURF gift honors Susan Mehrlust, a longtime friend of Ms. Hicken's who survived breast cancer for more than 10 years.

"Susan was my hero. She was given six months to live and she lived 10 years. She considered cancer a gift, because it allowed her to take her training as a teacher to another level as she taught people how to survive. The SURF award makes sense, because it educates the next generation of cancer fighters," Donna says.

Now she's taking her fight against breast cancer across the nation, to recruit participants for the 26.2 *With Donna: The National Marathon to Fight Breast Cancer*. Set for February 2008, in Jacksonville, the marathon is the first to raise money for breast cancer research. Most of its proceeds will support research at Mayo Clinic.

The marathon does more than combine her passions. Running was the key to her survival. "In every marathon, you hit a wall, but if you keep pushing, you can run through that wall and everything will be OK," she says. "For me, chemotherapy was that wall, and I just kept telling myself, 'It's the wall. It's the wall. Get to the other side.'"

For information about the 26.2 *With Donna: The National Marathon to Fight Breast Cancer*, please visit www.breastcancermarathon.com ■

MAJOR BENEFACTOR: **Judith and Scott P. Liggett, M.D.**

The Mayo Clinic experience

By Dianne M. Axen

Scott P. Liggett, M.D., knows Mayo Clinic from both ends of the stethoscope — as a physician and as a patient.

After completing his medical degree from the University of Nebraska Medical Center in 1977, Dr. Liggett came to Mayo to complete his residency in Internal Medicine and advanced studies in nephrology. Following residency, Dr. Liggett and his wife, Judith, moved to Nebraska where he became Lincoln's first nephrologist, specializing in the treatment of kidney diseases and disorders.

"No other organized nephrology center existed from Lincoln on west," says Dr. Liggett. "To consolidate that vacuum, I started six additional outpatient dialysis centers in the surrounding areas."

Knocking on a door, shaking a hand and saying, 'I have a service to offer,' is extremely gratifying," says Dr. Liggett. "I tell young residents today, 'you build a medical practice one relationship at a time.'"

Over the next two decades, he started more than 30 outpatient dialysis centers in communities throughout Kansas and Nebraska. In addition, he completed the Stanford University Transplant course, became certified by the United Network for Organ Sharing and served as medical director of the transplant unit in Lincoln for 20 years.

As the Liggetts built a life and raised their two children, Laura and Drew, Dr. Liggett also found time



Judith and Scott P. Liggett, M.D.

to run marathons. In 2000, after one late-night run, he noticed blood in his urine. His local physician ordered a cystoscopy, a test to examine the interior lining of the bladder.

"All I remember was the horrified look on the face of the surgeon," says Dr. Liggett. "And he simply said, 'I don't know what I'm looking at.'"

Dr. Liggett picked up the telephone and called Mayo Clinic. Within two days, the Mayo-trained doctor became a Mayo Clinic patient.

He was diagnosed with amyloidosis of the bladder, a rare and potentially fatal disease that occurs when protein substances build up in one or more of the body's organs. Since his diagnosis, Dr. Liggett receives a combination of laser treatments and intrabladder chemotherapy. "Knock on wood, it seems to be under control at this point," he says.

By twist of fate, Mrs. Liggett also became a Mayo patient. Last year, she had a virtual colonoscopy as well as a full-body scan, which detected a breast nodule that proved to be a localized curable-stage tumor.

Becoming a patient evoked new insights for Dr. Liggett.

"After you go through these experiences, you realize that not only are you entirely grateful, but you want to be certain that these services remain available for those who are yet to come," he says.

The Liggetts are Major Benefactors of Mayo Clinic. They also give generously of their time, talents and resources to their community.

"Whenever I hear someone pose the question, 'What has Mayo ever done for me?' I think to myself, 'Well — outside of everything, I guess nothing,'" says Dr. Liggett. ■

News at Mayo Clinic

The Mayo Legacy meeting in Arizona, March 29-31, 2007

The 12th annual meeting of The Mayo Legacy was held March 29-31, 2007, in Scottsdale, Ariz. Established in 1990, 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 Mayo Clinic. Attendees were given the opportunity to listen to a variety of medical presenters discussing the latest advancements in medicine and research. The next meeting is scheduled for Aug. 22-23, 2008, in Rochester, Minn. ■

Mayo Clinic proposes “Pay for Value” for health care quality improvement

In the February issue of *Mayo Clinic Proceedings*, Denis Cortese, M.D., president and CEO of Mayo Clinic, called for a reimbursement system based on value rather than the current “pay-for-performance” system used by many insurers, including Medicare. The proposed “Pay for Value” reimbursement system would reward hospitals for achieving good patient outcomes at lower costs, thereby improving health care quality and restraining spending far better than plans that encourage adherence to evidence-based standards. ■

Mayo Clinic receives Arizona arts award

In April, Arizona Citizens for the Arts recognized Mayo Clinic for its Humanities in Medicine program, which incorporates visual arts, music and poetry to support the Mayo ideal that the needs of the patient come first.

Victor F. Trastek, M.D., CEO of Mayo Clinic Arizona, accepted the award at the 26th Annual Governor’s Arts Awards Dinner. “We draw upon the talents of artists throughout the community who provide comfort and serenity for our patients,” he said. “It’s a long tradition at Mayo Clinic.”

The Humanities in Medicine program at Mayo Clinic in Arizona includes rotating art exhibits and weekly music concerts on the Scottsdale and Phoenix campuses. Two special programs, Sonata del Sol

and Poesía del Sol, bring comfort to patients at the bedside. Writers talk with the patients about their lives and compose a poem for them. Musicians and singers perform, often playing or singing a patient’s favorite song. Mayo Clinic collaborates with Arizona State University Herberger College of the Arts and ASU Creative Writing Program to bring these writers and musicians together with patients and their families.

The Center for Humanities in Medicine offers an array of programs, ranging from art exhibits to theater and dance events, at all three Mayo Clinic sites. These programs are made possible by the generous support of Mayo Clinic patients and benefactors. For additional information, see www.mayoclinic.org/humanities-in-medicine. ■



From left to right: Gov. Janet Napolitano; Victor Trastek, M.D., CEO of Mayo Clinic Arizona; Mark Edwin, M.D., chair, Mayo Clinic Center for Humanities in Medicine; C.J. Kennedy, coordinator, Mayo Clinic Center for Humanities in Medicine; Steven Yazzie, Navajo artist



Shirley Weis, chief administrative officer for Mayo Clinic

Modern Health Care announces 2007 “Top 25 Women in Health Care”

Modern Health Care Magazine reported substantial growth in the number of female health care executives. This year’s list of the “Top 25 Women in Health Care” featured Shirley Weis, chief administrative officer for Mayo Clinic.

From the boardroom to the executive suite, unique leadership style provides necessary and critical changes to improve the industry and its ability to care for patients. This year’s recipients made the list based on the following criteria: Successfully served as a leader or managed an organization or company; shown the ability or power to effect change in the health care industry; demonstrated a willingness to share expertise with others in the field; served as a role model or mentor to other female executives; and assumed a leadership position in the industry outside of own organization or company.

This year’s recipients were honored at an award dinner on Monday, May 21, in Dallas, TX. ■

The 5th District Eagles Cancer Telethon — Jan. 20, 2007

The Fraternal Order of Eagles raise millions of dollars every year to combat heart disease and cancer, making life a little brighter for those who suffer from disease.

Started in 1954, the 5th District Eagles Cancer Telethon presents the true spirit of philanthropy. Talent is showcased during the event presenting gifted amateur and professional performers who donate their skills for a good cause.

This year’s event raised more than \$722,000 to support cancer research; Mayo Clinic is a recipient of a portion of these dollars. These dollars have enabled Mayo to have a strong cancer research program which spans across all three campuses. Eagles’ funding provides financial resources to establish innovative programs in cancer research, and helps organize several vital, innovative research strategies that ultimately improve patient care. The generosity of the Eagles makes a profound difference in the lives of patients and their loved ones who struggle with cancer. Their generosity helps Mayo advance the diagnosis, treatment and prevention of cancer with direct benefit to the quality of life of the patient. ■

Good news for patients — Mayo Clinic offers three additional health insurance plans in Arizona

Mayo Clinic Arizona has established contractual relationships with CIGNA and Blue Cross Blue Shield (BCBS) Blue Card Program and expanded coverage under its existing Humana contract.

This is good news for people in Arizona whose insurance coverage did not previously provide in-state access to Mayo Clinic. In our mobile society, it’s also good news for patients whose coverage gave them access to health care at Mayo Clinic in Rochester, Minn., or Jacksonville, Fla., but prevented them from being seen in Arizona.

The terms of the CIGNA contract establish Mayo Clinic Arizona as an in-network provider option for specialty care for all CIGNA-insured commercial products. In addition, for some CIGNA plans, members will be able to receive primary care at Mayo Clinic Arizona.

Through the new BCBS agreement, Blue Card members from states outside of Arizona and a limited group of BCBS, Arizona PPO members, will now have in-network access to medical services at Mayo Clinic Arizona.

Under the new Humana agreement, a broader group of Humana members now have in-network access to Mayo Clinic Arizona.

Many patients are unaware that Mayo Clinic and other health care institutions must negotiate with the national insurance groups for access at each regional site. Mayo Clinic is striving to negotiate regional health plan contracts that will give patients the seamless ability to receive care at all three Mayo Clinic sites.

Because the terms of each contract are specific to Mayo Clinic Arizona, patients with CIGNA, BCBS Blue Card or Humana should determine if their plan provides coverage at Mayo Clinic Arizona. For information on these and other insurance plans, please refer to www.mayoclinic.org/becomingpat-sct/appointments.html. ■

Creating a new vision for health care

In May 2006, national leaders convened for the first National Symposium on Health Care Reform and laid the foundation for reforming the “non-system” of health care in the United States. The recommendations of the symposium defined the topics for four ensuing Health Policy Forums. These smaller, diverse gatherings of experts were charged to develop actionable reform principles for health care in collaborative, “think-tank” settings.

In the first forum, national leaders from all sectors of the economy assembled to address “Equity: Health Insurance for All Americans.” Participants agreed that the issue must be addressed comprehensively, not incrementally, and went on to develop four action principles for reform.

The second forum was themed “Improving Productivity in Health Care.” Experts from across the country focused on reforming current payment structures and created six action principles to encourage more efficient and effective delivery of health care.

For the third forum, another group of national leaders addressed “Increasing the Integration of Care.” They agreed on four major action principles that put patients at the center of the care system and create systems to reward value, coordinated care and good outcomes.

The fourth forum, “Effectiveness: Paying for Value,” will be conducted this summer.

According to Denis Cortese, M.D., president and CEO of Mayo Clinic, creating opportunities for national leaders from academia, business, health coverage and care, patient advocacy and public policy to come together and,

through their collective wisdom, create a shared vision for health care is crucial to any reform effort.

The action principles from all four policy forums will be the foundation for highly interactive discussions at the second Mayo Clinic Health Policy Center National Symposium on Health Care Reform in March 2008. For more information about the Health Policy Center and its reform efforts, go to www.mayoclinic.org/healthpolicycenter. ■

New Exhibit: Welcome to “Swiftly and Safely: A Century of Transporting Patients to Mayo Clinic.”

Located near Mayo Clinic Heritage Hall in the Mathews Grand Lobby of the Mayo Building in Rochester, Minn., this exhibit features a horse-drawn ambulance, purchased by the Mayo brothers from the Studebaker Co., circa 1905. When motorized vehicles became common after World War I, the ambulance retired to Mayowood. The children of Dr. Charles W. and Alice Mayo donated it to Mayo Clinic in 2006.

Heritage Hall, which has locations on each Mayo Clinic campus, was founded with a generous gift from John T. and Lillian G. Mathews. ■



Rendering of pediatric center

Grand opening of the Mayo Clinic T. Denny Sanford Pediatric Center

The Mayo Clinic T. Denny Sanford Pediatric Center is expecting its first patient in July of 2007. The grand opening celebration is planned to kick-off in late summer.

T. Denny Sanford has a special interest in supporting organizations and groups that focus on the needs of children. Mr. Sanford says, “I’m excited about this collaboration with Mayo Clinic. The pediatric center is part of a dream to ensure specialty care for young patients in one of the most respected health care settings in the world, and to build a relationship with Sanford Children’s Hospital in Sioux Falls.”

The center is located on the 16th Floor of the Mayo Building in Rochester, Minn. and serves to unite pediatric subspecialty and referral practices. ■



The horse-drawn ambulance was purchased by the Mayo Brothers around 1905.

Minnesota Partnership dedicates Stabile labs

A dedication of the three-story addition to the Vincent A. Stabile Building in Rochester, Minn., was held on Jan. 26, 2007. The addition houses genomic laboratories, facilities for bioinformatics, and teleconference and meetings rooms that will support the Minnesota Partnership for Biotechnology and Medical Genomics.

Highlights:

- The partnership is awarding \$7.5 million in state-provided support to four new research teams and one infrastructure support project.
- Medica Foundation awarded a \$5 million grant to support three research projects in cancer and heart disease, as well as two projects to provide critical research infrastructure improvements.
- Minnesota Legislature approved \$25 million in biennial funding for the partnership and committed \$8 million for each of the two years following that period. The funding will directly support scientific research and help recruit top scientists to Minnesota. The partnership is actively recruiting four scientists and is seeking applications for new research ideas from the two partnering institutions. ■

Mayo Clinic Opus Building dedication — Sept. 10, 2007

In March of 2006, the Mayo Clinic Opus Building ground-breaking ceremony was held in Rochester, Minn. Research in this building will focus on discovery and development of new medical imaging technologies and integration of innovative techniques into Mayo Clinic's patient care.

Mayo Clinic will celebrate the official opening of the Opus Building on Sept. 10, 2007. A variety of events will take place to honor this occasion. ■

Jacksonville previews new lobby

In June, construction of the new hospital in Jacksonville reached its most significant milestone yet with the completion of the James E. and Florence N. Davis Lobby and Gallery.

More than 250 benefactors and Mayo staff celebrated the milestone and toured the lobby and gallery at a June 3 preview event. The gateway to the new hospital's 214-bed patient tower, the lobby and gallery exemplifies Mayo Clinic's patient-centered approach to building design. Features include an art gallery, a Dale Chihuly chandelier, Mayo Clinic Heritage Hall, a blue marble water wall and an area honoring hospital benefactors.

The new hospital will open in spring 2008. For information about the hospital campaign, please call (904) 953-7200. ■



Chihuly chandelier at new hospital in Mayo Clinic Jacksonville

Mayo Clinic Board of Trustees honors new named professors

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

Piero Rinaldo, M.D., Ph.D., was awarded the T. Denny Sanford Professorship of Pediatrics, which was established in 2005 to honor an exceptional professor working in pediatric research or education. The Sanford Professor will be significantly involved in providing leadership and support for a unique collaboration between Sanford Health in Sioux Falls, S.D., and Mayo Clinic in pediatric research, practice and education. Dr. Rinaldo's research interests are the study of inborn errors of metabolism as the cause of pediatric sudden and unexpected death, and the application of tandem mass spectrometry to screening of genetic disorders.

Matthew Ames, Ph.D., was awarded the Sandra J. Schulze Professorship, one of two professorships established by The Richard M. Schulze Family Foundation in 2005. The professorship recognizes outstanding physicians and scientists who are internationally renowned for their work in cancer research and novel therapeutics. Dr. Ames' research focuses on the development of more effective agents for the treatment of malignant diseases.

Randall Roenigk, M.D., was awarded the Robert H. Kieckhefer

Professorship in Dermatology, which was established in 1974 by Robert H. Kieckhefer of Prescott, Ariz., through funding from the J. W. Kieckhefer Foundation. Dr. Roenigk's research and clinical practice focuses on cutaneous oncologic surgery, Mohs' micrographic surgery, reconstructive surgery and cosmetic procedures of the skin.

Robert Diasio, M.D., was awarded a William J. Mayo, M.D., and Charles H. Mayo, M.D., Professorship. This is one of four such professorships established in 2004 to celebrate the Mayo brothers' commitment to learning and teaching. Dr. Diasio's clinical interest is in the area of gastrointestinal oncology, and his basic research interest has been focused in the area of biochemical, molecular and clinical pharmacology of anti-cancer agents, with a particular interest in anti-metabolites; oligonucleotide therapy for gene modulation; and

recently, targeted therapy approaches.

Kenton Kaufman, Ph.D., received the W. Hall Wendel, Jr. Musculoskeletal Research Professorship. As a professor of biomedical engineering and consultant in the departments of Orthopedic Surgery, Physiology and Biomedical Engineering, Dr. Kaufman focuses his research on the biomechanics of human movement.

Clifford Jack Jr., M.D., was named the Alexander Family Professor in Alzheimer's Disease Research. Dr. Jack's research group develops and validates magnetic resonance imaging techniques for diagnosis and measuring progression of Alzheimer's disease and related disorders.

John Burnett Jr., M.D., received the Marriott Family Cardiovascular Research Professorship. The professorship is awarded to a leading cardiovascular researcher who excels at

translational research — the effective translation and timely application of discoveries into clinical practice. His research has advanced the understanding of humoral mechanisms in heart failure and hypertension and the role of the kidney in cardiovascular disease. In addition, he holds several patents, and new novel drugs discovered in his laboratory for heart failure are now entering clinical trials.

Jeffrey Platt, M.D., was named the recipient of the Dr. Francis Chucker and Nathan Landow Research Professorship. Dr. Platt's research concerns the biology and treatment of immunodeficiencies, chronic viral infections, tumors, organ failure and infections. His research has led to breakthroughs in various fields, including transplantation, immunology, stem cell biology and genetics. ■



Piero Rinaldo, M.D., Ph.D.



Matthew Ames, Ph.D.



Randall Roenigk, M.D.



Robert Diasio, M.D.



Kenton Kaufman, Ph.D.



Clifford Jack Jr., M.D.



John Burnett Jr., M.D.



Jeffrey Platt, M.D.

Public Members of Mayo Clinic Board of Trustees

Robert E. Allen
Former Chair and CEO
AT&T
New York, N.Y.

James L. Barksdale
Chair, Mayo Board of Trustees
Chair, Barksdale Management
Corporation
Ridgeland, Miss.

Barbara M. Barrett
Chair
U.S. Advisory Commission
on Public Diplomacy
Phoenix, Ariz.

John H. Dasburg
Chair and CEO
ASTAR Air Cargo, Inc.
Miami, Fla.

Sen. Thomas A. Daschle
Special Policy Advisor
Alston & Bird, LLP
Washington, D.C.

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

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

Jerome H. Grossman, M.D.
Senior Fellow
JFK School of Government
Cambridge, Mass.

Roy A. Herberger Jr., Ph.D.
President Emeritus
Thunderbird, The Garvin School
Glendale, Ariz.

Patricia E. Mitchell
President and CEO
The Museum of Television & Radio
New York, N.Y.

Marilyn Carlson Nelson
Chair and CEO
Carlson Companies, Inc.
Minnetonka, Minn.

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

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

Hugh B. Price
Senior Fellow
Brookings Institution
Washington, D.C.

Lee R. Raymond
Former Chair
ExxonMobil Corporation
Irving, Texas

Anne M. Tatlock
Former Chair and CEO
Fiduciary Trust Company
International
New York, N.Y.

Mayo Magazine

We publish *Mayo Magazine* three times a year for benefactors and friends of Mayo Clinic.

Director of Communications:
Suzanne Leaf-Brock

Managing Editor: Michelle Felten

Editorial Assistant: Kristin K. Chinnow

Contributing Writers: Dianne M. Axen,
Matt Derechin, Michelle Felten,
Laurie Simon, Suzanne Winckler

Editorial Review: Kristin K. Chinnow,
Michael McDaniel

Art Director: Mary A. Ayshford

Graphic Designer: Denise M. Otteson

Please address comments to:
Suzanne Leaf-Brock
Mayo Magazine, Mayo Clinic
Siebens 9
200 First Street NW
Rochester, MN 55905
(507) 266-0091
mayomagazine@mayo.edu
www.mayoclinic.org/development

Mayo is a nonprofit 501 (c)(3) charitable organization, and contributions are tax-deductible to the extent allowed by law. Contributions support Mayo programs in patient care, medical education and research, which improve the quality of medical care that benefits people everywhere.



4500 San Pablo Road
Jacksonville, FL 32224

MC2386-SU07

200 First Street SW
Rochester, MN 55905

13400 East Shea Boulevard
Scottsdale, AZ 85259

www.mayoclinic.org

©2007 Mayo Foundation for Medical Education and Research (MFMER). All rights reserved. MAYO, MAYO CLINIC and the triple-shield Mayo logo are trademarks and service marks of MFMER.

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



The quilt featured on the cover was created in celebration of Mayo Clinic Arizona's 20th anniversary. The 13-foot by 5-foot quilt is a visual feast and an interpretation of Mayo's mission. See story on page 22.

Research technician

Bridget Stensgard

By Suzanne Winckler

The profession of science requires patience, diligence, collaboration and focus. These are skills Bridget Stensgard learned growing up with 13 siblings on a dairy farm near Rochester, Minn. They are the traits David Toft, Ph.D., recognized immediately when he hired Ms. Stensgard 32 years ago as a technician in his research lab at Mayo Clinic Rochester.

She and her siblings worked as a team, and all had assigned tasks. “Every morning I would do my chores — feed the calves, help milk — then get ready for school,” she says.

In fact, the term “farm team” has a special meaning at Mayo, and Ms. Stensgard personifies a particular kind of Mayo Clinic employee. For more than a century, the farms of Minnesota, Iowa, Wisconsin and the Dakotas have been like a minor league system for developing countless people who have become Mayo Clinic employees.

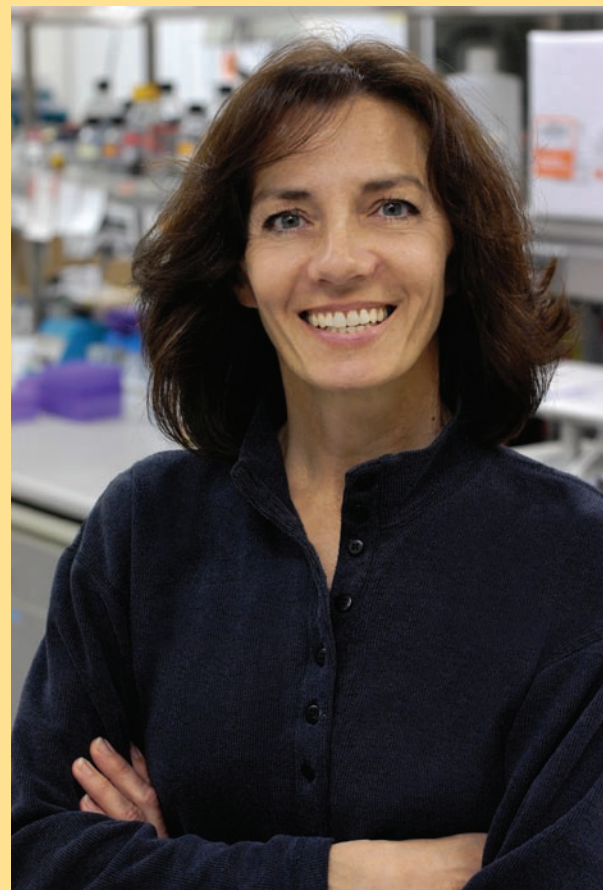
“When you grow up on a farm you work hard, and that carries over to whatever work you pursue as an adult,” Ms. Stensgard explains. “Coming from a farm gives you a great work ethic. It also teaches you responsibility and common sense.”

After graduating from high school, she looked for a science-related job at Mayo. “I was a lab assistant in high school, and I always enjoyed biology,” she says. “Thankfully, Dr. Toft hired me. I still enjoy coming to work after 32 years.”

For more than three decades, Ms. Stensgard has applied her common sense to learning research protocols. She is currently taking a one-month laboratory course in molecular biology techniques. In Dr. Toft’s lab, she is an integral part of his research, which focuses on a class of proteins known as molecular chaperones. One of these — heat-shock protein 90 — is of special interest in the growth of cancerous tumors.

Ms. Stensgard’s work in the lab encompasses both basic discovery and translational research with clinical applications.

Dr. Toft holds Ms. Stensgard in high esteem. “She is efficient, even-tempered and positive,” he says. “There’s only one problem. Every postdoctoral fellow who leaves the lab tries to hire her away from us.”



Bridget Stensgard

While she worked full-time at Mayo Clinic, she and her husband, Loren, raised four sons. The eldest, Bryan, is a chemical engineer. Daniel will soon graduate with a degree in law enforcement. Erik is a pre-pharmacology student working on a degree in biochemistry. Jonathan, a high school senior, is considering a career in nursing.

Ms. Stensgard’s favorite place to be is their 65-acre farm near Lanesboro, Minn. “Loren, the boys and I all love being outdoors,” she says. “They hunt deer and turkey. I enjoy gardening, and every spring I plant trees. I order a bunch of oaks, maples and conifers from the county.” It seems, even when relaxing she isn’t idle.



Department of Development
200 First Street SW
Rochester, Minnesota 55905