

A young child with dark skin and short hair, wearing a red sleeveless top with a yellow and white floral pattern, looks towards a female doctor. The doctor, wearing glasses and a white lab coat, is smiling warmly at the child. The background is a blurred clinical setting.

2005 Dean's Report

Medical School
UNIVERSITY OF MINNESOTA

Mission

The mission of the University of Minnesota Medical School is to be a leader in enhancing the health of people through the education of skilled, compassionate, and socially responsible physicians. With two campuses in Duluth and the Twin Cities serving diverse populations in rural and urban Minnesota, the Medical School is dedicated to preeminent primary care medicine, exemplary specialty care, and innovative research.

The University of Minnesota is both a land-grant and a major research institution. Its main campus is located in the Twin Cities of Minneapolis and St. Paul, a metropolitan area of more than 2.6 million people.

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COVER IMAGE: Research by pediatric oncologist Brenda Weigel informs her care of patients such as Dalier Rose Jones.

Credits

EDITOR: Allison Campbell Jensen

WRITERS: Mary Hoff, Brenda Hudson,
Allison Campbell Jensen, Erin Peterson

PHOTOGRAPHY: Richard Anderson (unless noted), Scott Strebler

DESIGNER: David Simpson

From the Dean

M

Meeting medical students is one of the great pleasures of my job. Compassionate, idealistic, and intellectually gifted, they're eager to share their passion for research, for improving patient care, for reaching out to the underserved. They represent the future of the medical profession and, judg-

ing by the representative students from our University of Minnesota Medical School profiled in this 2005 Dean's Report (p. 12), that future is bright.

The prospects for our Medical School also are bright. We were pleased this past year to receive positive reviews on our graduate medical education program from the Accreditation Council for Graduate Medical Education and for our Medical Scientist Training Program (page 14).

We also were pleased and honored last winter when physician-writer Atul Gawande wrote about our successful cystic fibrosis program and its dedicated leader, physician Warren Warwick, in the *New Yorker* magazine. That commitment to excellence permeates our faculty. It also is exemplified by our bone marrow transplant program. We performed the first successful operation in 1968 and our team continues to make breakthroughs (p.16).

In research, we continue to move forward. Our researchers benefit from the best technology available, as illustrated in the story on brain imaging (p. 11). This summer, we open the McGuire Translational Research Facility, which will house 33 researchers from the Medical School and the College of Pharmacy in a building designed to foster interdisciplinary research collaborations. The facility was built on the foundation of philanthropy, with state and University funding—a model I will return to later.

On the two campuses of the University of Minnesota Medical School, in the Twin Cities and in the two-year program in Duluth, faculty continue to refine our vision for medical education and build on our strengths. On Transition Day to clerkships, stu-

dents from the two campuses come together and begin to build the future (p. 15). Our Medical School provides an exciting environment to nurture promising future physicians and scientists.

A call for commitment

Yet despite bright promise, future physicians face clouds on the horizon. Some of the challenges were outlined in Medical Educational Costs and Student Debt, a March 2005 report to the Association of American Medical Colleges from a working group that I chaired. Our group found that many medical students increasingly rely on loans to finance their increasingly expensive educations—and yet physicians' salaries have not been growing at a comparable rate.

We reported that for the past 20 years, more than 60 percent of all medical students came from families with incomes in the top fifth nationally. Only 20 percent of medical students, on the other hand, come from families with incomes in the lowest three-fifths nationally. This statistic is troubling because, to better serve society, the medical profession ought to better mirror American society. Looking ahead, our group's work projects that by 2030, physicians who attend public medical schools would spend as much as 40 percent of their take-home pay on payments for their educational debts.

That's discouraging news for individuals who consider becoming our future doctors—and it's not an acceptable future scenario for any of us in medical

education, in the medical profession, or in our society. Health care is an issue for everyone; funding for health professional education needs to be an issue for all of us.

Staying with the status quo is not an acceptable option.

That said, today's medical education funding is extraordinarily complex. To finance the University of Minnesota Medical School, the school relies on dollars from state and federal governments, support from the clinical enterprise on campus and in the community, philanthropic gifts, and tuition. (Research funding primarily funds research, benefiting education only indirectly.)

Yet we now live in a time in which government or public support seems to be stagnant at best, all clinicians who teach medical students struggle with time and revenue pressures, and many worthy causes and institutions compete for charitable dollars. Raising tuition is not the answer because, as our report to the AAMC indicated, high costs already affect choices of people currently underrepresented in medicine.

We can act locally. At the University of Minnesota Medical School, we have introduced a cost-of-degree model, which guarantees students in an entering class that their annual cost of tuition will not change during their four years of medical school. This increases transparency and predictability for their financial future—and thus meets two of the recommendations in our report to the AAMC on costs and debt. In addition, I am working with the Minnesota Medical Foundation to increase the number of full scholarships for students who need and deserve them (another report recommendation).

Even though any relief that can be offered to individual students is admirable, I also believe we in medical education must aim higher and go beyond our immediate, local needs.

We must rethink our charge. Does the way we carry out medical education in 2005 suit the patterns of the last century or the needs of this one?

We must reclaim the importance of our profession. Medicine and physicians serve individual patients and



the wide society by combining scientific skills with healing arts; ours is an honorable profession.

We must rewrite the social contract between medicine and society. Physicians provide a public good, which calls for a community or public investment.

A renewed commitment will help us focus on solutions. While no simple answers arise, we can look at expanding loan forgiveness programs, seeking sponsorship by cities, towns, or counties for medical students who will return to serve as physicians, or targeting foundations or health organizations for support. The McGuire building was built on the basis of a \$10 million gift from the William W. and Nadine M. McGuire Foundation, which leveraged support from the State of Minnesota, a \$3 million commitment from the College of Pharmacy, and funds from the University of Minnesota. It's an exciting example of what can be accomplished when many work together for a goal.

As dean of this medical school, I have the responsibility to ensure we educate our students and residents to be life-long learners who can meet the challenges ahead. I cannot do that alone, however, and neither can they. As a society, we must coalesce around the idea that health care is a common good that we all agree must be supported and nurtured to ensure a brighter future for all.

Deborah E. Powell, M.D.
Dean of the Medical School
Vice President for Clinical Affairs
McKnight Presidential Leadership Chair
University of Minnesota



Dorscher to lead American Indian association

In August 2005, Joycelyn (Joy) Dorscher becomes president of the Association of American Indian Physicians. She heads the University of Minnesota Medical School Center of American Indian and Minority Health and is an assistant professor in family medicine. Dorscher is affiliated with the Turtle Mountain Band of Chippewa Indians. AAIP is dedicated to pursuing excellence in Native American health care by promoting education in the medical disciplines, honoring traditional healing practices, and restoring the balance of mind, body, and spirit.

Think globally

Because of its students' interests, course offerings, cross-cultural community programs, and international experiences, the University of Minnesota Medical School provides a rich environment for those seeking global engagement. In recognition, the University of Minnesota Medical School was selected as the recipient of the 2005 Paul R. Wright Award for Excellence in Medical Education and Excellence in Global Health, given by the American Medical Student Association. The selection committee was impressed with the school's integration of global health into the medical education curriculum.

Georgopoulos joins Institute of Medicine

Neuroscientist Apostolos Georgopoulos was elected last fall to the Institute of Medicine. "He has a breadth of knowledge of neuroscience both at the basic and human disease level that we absolutely



need for the Institute of Medicine," says Deborah Powell, dean of the Medical School and IOM member. Georgopoulos holds the McKnight Presidential Chair in Cognitive Neuroscience at the University of Minnesota, was recently named to the University's Academic Health Center Academy for Excellence in Health Research, and also is director of the Brain Sciences Center at the Minneapolis Veterans Administration Medical Center. His research on neural mechanisms underlying movement has resulted in breakthroughs in understanding of the motor cortex and the complex tasks it controls. With Kamil Ugurbil, head of the University's Center for Magnetic Resonance Research, Georgopoulos recently was selected to co-direct the Minnesota site of the MIND Institute. This new national institute supports research on brain mechanism using functional magnetic resonance imaging and magnetoencephalography. He brings his expertise to the Institute of Medicine, which since its founding in 1970 has become recognized as a national, independent resource for analysis and recommendations on health.

Connecting head and heart

Physiology researcher John Osborn heads a new collaborative effort, the Neurogenic Cardiovascular Disease Consortium. "Ultimately we hope to find the genetic causes in the brain that lead to cardiovascular disease," says Osborn of the consortium, which includes researchers from University of Minnesota, Michigan State University, University of Florida-Gainesville, University of Texas-San Antonio, and University of Pittsburgh. The consortium, funded for five years with \$5.8 million from the National Institutes of Health, initially will focus on the neural mechanisms of hypertension.

Nichol first to receive Charles Mérieux Award

Kristin Nichol, whose research focuses on vaccine-preventable diseases in adults such as influenza and pneumonia, was the first-ever recipient of the Charles Mérieux Award for Scientific Achievement presented by the National Foundation for Infectious Diseases in May 2005. To address critical factors for the prevention and control of influenza and pneumococcal disease among adults, she has conducted observational studies, clinical trials, and cost-effectiveness studies. Nichol is a professor of medicine at the University of Minnesota Medical School and director of the primary and subspecialty medicine service line at the Veterans Administration Medical Center in Minneapolis.



Gold Humanism Honor Society chapter established

“We are recognizing humanism in medicine as equal to excellence in academics,” said Dean Deborah Powell at the inaugural ceremony Oct. 22, 2004, for the University of Minnesota Medical School’s chapter of the Gold Humanism Society. Participating in the ceremony were Drs. Arnold P. Gold and his wife, Sandra Gold. Compassion, integrity, excellence, altruism, and respect for others were among the humanistic values demonstrated by six faculty members, eight residents, and 31 members of the class of 2005 who were inducted into the Medical School’s new honor society.



Dr. Arnold Gold and Dean Deborah Powell

Tonkin receives research award

Medical student **Paul Tonkin** received the first place national award for student research for his presentation on the Effects of Rising Medical Student Debt on Residency Specialty Selection at the October 2004 annual meeting of the Scientific Assembly of the American Academy of Family Physicians.

Two department heads named

John Schreiber became chair of the Department of Pediatrics in August 2004. He was previously chief of Infectious Diseases, Allergy, Immunology and Rheumatology at Rainbow Babies and Children’s Hospital and Case Western University. In March 2005, **Richard Prielipp** assumed leadership of the Department of Anesthesiology. He came to Minnesota from Wake Forest University School of Medicine, where he was a professor of anesthesiology and critical care.



Connecting with China

Building on a previous connection, Zhanpei Liu (left), head of Sichuan University’s graduate medical education program, led a delegation to Minnesota in January. He is shown here with Louis Ling, head of University of Minnesota’s graduate medical education program. The delegation’s visit to investigate residency education in Minnesota was a follow-up to a visit last summer by a University of Minnesota leadership group that included Dean Deborah Powell to their institution in Chengdu,

Sichuan. During that 2004 visit, the two universities signed memoranda of agreement between their academic health centers, medical schools, and schools of public health. Sichuan University’s medical school was established in 1910 by missionaries from the United States, Canada, and Great Britain, so classes are offered in English, increasing the potential for exchanges.



John Schreiber

Close to the heart

To publicize the Heart Truth campaign, Medical School cardiologist Anne Taylor joined First Lady Laura Bush, Elizabeth Nabel, director of the National Heart, Lung, and Blood Institute at the National Institutes of Health, and the Duchess of York, who has been a spokesperson in the campaign against obesity, in New York City Feb. 4, 2005. The Heart Truth campaign, an NHLBI project, aims to raise awareness that heart disease is a major health concern for women. Taylor, who serves as a spokesperson for women’s heart health for the American Heart Association and the Association of Black Cardiologists, is study chair of the African-American heart failure trial, the results of which were published last year in the *New England Journal of Medicine*. She also serves as associate dean for faculty affairs in the Medical School.



Richard Prielipp

Training the immune system to fight cancer

“What can you do?”

It’s one of the most heartfelt questions pediatric oncologist Brenda Weigel hears. Parents of children suffering from cancer desperately want a cure; they want to know what Weigel and her team can do for their child.

“We do everything we can, but we don’t always have the answers,” she says, “and that’s hard.”

Not having all the answers impels Weigel in her work as both researcher and physician. In seeking to improve the care of her young patients, Weigel is investigating how the immune system might be harnessed to fight tumors in children. Through laboratory research, Weigel and her colleagues have identified compounds that may be successful in targeting leukemia and solid tumors. She hopes these findings will translate into better treatment options. “The more we learn and move things forward—that’s what drives me,” she says.

To identify potential drugs, compounds, or cellular therapies, researchers need an appropriate model. Models also are used to help understand progression of disease. In this regard, Weigel was lucky enough to obtain one of the few cell lines of rhabdomyosarcoma in a mouse. Rhabdomyosarcoma is the most common soft tissue cancer in children. “We’re using rhabdomyosarcoma as a model to develop new immune-based therapies that may work in this

tumor as well as in other solid tumors,” Weigel says.

With her colleagues, Weigel began using the rhabdomyosarcoma model to look at how different compounds could trigger the immune system to fight childhood cancers—something she has successfully achieved in leukemia models. Weigel is examining new drugs and strategies that may “retrain” the immune system to fight leukemias and solid tumors. “We’re using models as a screening tool for possible clinical trials,” says Weigel, “identifying potential drugs to take into a Phase I trial.”

One compound Weigel has her hopes on is called CpG, which is modeled on the DNA of bacteria. CpG, a synthetic compound, is recognized by the immune system to fight bacteria, explains Weigel. It seems CpG is capable of turning on the immune system.

CpG has been shown to have some effect in the rhabdomyosarcoma model, as well as in leukemia. In addition, the work on CpG has formed the basis of a Phase II clinical trial in adult lung cancer. “The hope is some day we will be able to take that knowledge into children,” she says.



Pediatric oncologist Brenda Weigel seeks to turn on the immune system to help patients such as Dalier Rose Jones.

Weigel is hopeful but also realistic about these therapies' potential. "Only one in ten of those drugs ever make it," she says.

Developing a treatment in the lab that is clinically successful is the Holy Grail for physician-scientists like Weigel. "It's very exciting to see something that you personally worked on in the lab actually having a chance to make a difference," she says. "It's an amazing opportunity to be at that interface between research and care."

Weigel sees patients weekly. Physicians also refer their very ill patients who may be eligible for Phase I studies. Overall, about 70 to 75 percent of children with solid tumors are cured in the long-term, she says. However, once cancer metastasizes or spreads to another part of the body, the chance of cure is 30 percent, at best. And if the cancer comes back, a cure is even less than 20 percent. "These are the kids who we really need to help."

Parents who ask Weigel what can be done in these cases sometimes opt for participation in a clinical trial. "For their child, [the

"The hope is some day we will be able to take that knowledge into children," says Brenda Weigel.

clinical trial] may realistically not make a difference, but it may make a difference for a child down the road. And for a lot of families that's an incredibly important piece."

Weigel believes that hope is essential for families. "They always go in with hope, and you never take hope away. Some of these new [treatments] right now may not make a difference for them, but the more you learn and the more we can move things forward, we may be able to make a difference down the road."

"And that's what drives you and keeps you going"

Say that a new development in diabetes management was discovered in the lab today. How long would it take before the finding is translated into standard practice in primary care clinics? Six months? One year? Five years? Ten?

According to family medicine physician and researcher Kevin Peterson, it typically takes 17 years to move advances from the research lab into practice. “That’s far too long,” he says. And, that’s just 30 percent of information—which is far too little, he adds. For example, in 1993 it was discovered that the complications of diabetes could be prevented by lowering glucose levels in type 1 diabetes, and in 1998 it was proved that the major complications of diabetes could be prevented in type 2 diabetes by better glucose and

tion with electronic medical records (EMR).

Once a physician is notified that a patient is eligible for a particular clinical trial, the physician may discuss the option with the patient, says Peterson. If he or she is interested, most likely the trial can be conducted locally by the patient’s physician through support provided by the network. “The ePCRN means potential study participants need not be physically close to a research site to have access to the latest drugs and clinical trials,” he says. “A patient in rural Wyoming will have as equal access as someone in New York City.” Once patients are enrolled, the ePCRN will send targeted reminders to participants’ physicians for follow-up and care.

In addition, the ePCRN will establish a national registry of specific conditions or diseases. The establishment of comprehensive national online databases linked to EMR will facilitate both automated epidemic identification and rapid response, says Peterson, “important for the public health of our nation.” This open-source standardized electronic registry will also provide primary care practices the means to examine

Linking research and care, electronically

blood pressure control. Yet today, less than half of all patients with diabetes have well-controlled blood sugars and only 36 percent have satisfactory blood pressure control.

“Our health care system was originally built to treat acute injuries and infections, not to serve the ongoing needs of people with chronic illness,” Peterson says. “But with the enormous strides in medicine over the past 100 years, today we find it is chronic disease that provides the greatest challenges for our delivery system.

“One of the things that doctors in the community are most interested in is how they can improve their care delivery,” he says. Peterson decided something had to be done to help speed the time it takes to move research into practice. “First, we need to broaden patient involvement in clinical trials through better communication with primary care physicians. Then, we need to foster the translation of research findings back into the clinics—which also involves better communication.”

An electronic infrastructure will aid in this process, Peterson believes, and the National Institutes of Health (NIH) agrees. In October 2004, Peterson was awarded a \$3 million NIH contract to develop the electronic Primary Care Research Network (ePCRN). This network will allow physicians in primary care practices anywhere in the United States to link with researchers conducting randomized clinical trials. It will also update physicians on the most current research findings and establish a national registry of diseases.

“Primary care is currently underutilized for patient recruitment for many reasons, but an important reason is because it’s difficult for physicians to keep abreast of available clinical trials,” says Peterson. Also most clinical trials have strict eligibility requirements. The new network will provide primary care physicians with information on suitable clinical trials for their patients through integra-

quality and performance in their practice.

The ePCRN will provide primary care clinics with electronic tools for immediate evaluation of the clinic’s population and help with primary prevention and chronic disease management. This is particularly important since third party payment is increasingly linked to performance on population-based quality measures. “We put research into practice and put practice into research,” says Peterson. “It’s a great tradeoff for the American people.”

The ePCRN project is an interdisciplinary and international collaboration, part of the NIH Roadmap Initiative “Re-engineering the Clinical Research Enterprise” that aims to accelerate and strengthen clinical research through an improved, systematic infrastructure. Led by Peterson and Steven Cawley, associate vice president of technology at the University of Minnesota, the ePCRN also includes researchers from the University of Birmingham, England, and the University of California, San Francisco.

Initial response has been encouraging, from directors and physicians alike. Peterson hopes to have 250 physicians onboard for clinical research next year.

“I think that primary care practice without a basis or without a connection to research becomes obsolete, but at the same time, research that doesn’t have a connection to practice becomes arcane,” Peterson says. “The ePCRN bridges the gap between research and practice.”

A patient in Wyoming will have as equal access to clinical trials as someone in New York City.

“The brain is an incredibly plastic and dynamic organism,” says psychiatrist Kelvin Lim, examining a set of brain images. These images, coded in various colors, represent the physical wiring of the brain critical to the brain’s ability to communicate between cortical regions.

This type of image, called diffusion tensor imaging, was not possible until recently and is providing new ways of understanding the brain.

“We have tremendous resources [at the University], both in clinical research” in terms of investigator expertise across disciplines, he says, “as well as our strengths in neuroimaging at the Center for Magnetic Resonance Research.” The CMRR is a research-dedicated imaging facility that provides investigators with state-of-the-art imaging technology. Because the center is dedicated to research, “we’re not limited by the schedule of the scanner in the hospital,” says Lim.

“So many of the things I was taught [in medical school 20 years ago] have changed,” Lim reflects. For instance, back then, it was believed that neurons are not produced during adulthood, he says, “but now there is evidence of neurogenesis in adults,” which is the growth of new neuronal cells.

“Perhaps that’s an important lesson for us. Our knowledge base can change—and will change—and while we need to remain critical, we also need to be open to new ideas.”

Lim practices the balance between being critical and being open about new knowledge in his work investigating the relationship between cognition and the structural organization of the brain. He wants to know how cognition develops or is affected in relation to the brain’s organization in areas including schizophrenia, adolescent brain development, genetic disorders, substance and alcohol abuse, and aging. To help him uncover these mysteries, he is enlisting the help of increasingly more sophisticated neuroimaging tech-

macrostructure of the brain, such as how the volume of white matter changes in development or disease. “Being able to use both tools gives us a more complete picture of the brain’s workings,” he says.

Lim uses these tools to examine the brain’s connectivity, which occurs in the white matter. He is conducting studies that track changes in brain organization as part of normal development, such as adolescence and aging, as well as in instances of disease and disorder. Until recently, “the study of the brain’s white matter was ignored except for known white matter diseases, such as multiple sclerosis.”

Researchers and physicians are now beginning to appreciate that white matter is affected in other disorders too, such as schizophrenia or substance abuse. “We know that our higher cognitive

Opening up new territory

Until recently, says Kelvin Lim, “the study of the brain’s white matter was ignored except for known white matter diseases, such as multiple sclerosis.”

niques—techniques that illustrate the brain’s function and structure in ways not seen before.

For instance, diffusion tensor imaging allows Lim to examine the microstructure of the brain’s tissue. “Now we can actually examine the organization of brain tissue,” says Lim. Diffusion tensor imaging measures how water molecules diffuse in tissue. “It has the advantage of our bodies being 90 percent water. Since the water’s already there, we don’t have to inject anything,” he says. This imaging technique provides information about the structural organization of the tissue.

In addition to diffusion tensor imaging, Lim also uses conventional magnetic resonance imaging (MRI) to evaluate changes in the

functions are based on the interactions of different cortical regions, also known as neural networks,” says Lim. “We also know that white matter is the physical wiring that connects these brain regions. So if the communication is garbled or broken, this will disrupt the operation of the neural network—and disrupt cognitive functions.”

Neuroanatomical studies have shown that the brain is highly organized and interconnected. “It’s not just spaghetti,” says Lim.

When white matter tissue is coherent and tightly bundled, water diffusion is also coherent. But if the white matter gets disrupted or disorganized, then the water diffusion will also become disorganized. These changes are quantifiable, says Lim. The diffusion measurements change with development and also are altered in diseases, meaning that “alterations in the microstructure tissue integrity are associated with changes in cognition.”

For instance, Lim has found that the organization of white matter is related to the impulsivity of individuals. “The greater the disorganization of the white matter, the greater the impulsivity of the person,” says Lim. This could influence treatment of substance abuse, he adds.

“My goal as a researcher and physician is to assist in the treatment, prognosis, and diagnosis of disorders.” In a neurodevelopment disorder, potential biological markers might be critical for our ability to provide earlier detection, he says.

Measurement of changes in the brain may also be useful in monitoring treatment in disorders such as Alzheimer’s. “For instance, if there is an intervention, does it slow the progression of the disorder?” Lim’s images may illuminate the answer.

Medical student • mosaic

Flexibility in their education is a major draw for students at the University of Minnesota Medical School. Medical students may pursue research, choose from a variety of elective rotations, or expand their horizons with international experiences, as one-quarter of them choose to do. “They develop their own pathways,” says Theodore Thompson, director of education for years three and four. And sometimes, as with the students profiled below, they blaze trails.

“I’m tricultural,” jokes **Shannon Herrera**, referring to her mother (Italian) and her father (American Indian and Mexican). Because her father is a Marine, Herrera’s family regularly moved from one military base to another. Yet she still feels a strong connection to her Kansas Kickapoo tribe because of the teachings of her grandmother, who grew up on the reservation and lived with her family for several years. That connection grew into commitment when Herrera was an undergraduate taking an American history class that discussed health disparities affecting American Indians. “I learned about all these preventable problems and lack of access,” she says. “I wanted to help a community that I felt a part of.” After deciding to become a doctor, she applied only to the very few medical schools that have programs such as Minnesota’s Center for American Indian and Minority Health. She felt welcomed dur-

ing the interview and four years later, she is preparing to go to San Diego to serve her residency in the Navy. Before she goes, however, she will help CAIMH with a summer program to teach science to American Indian children from fourth through seventh grades. During her medical school years, she also devoted time to speak to high school students such as those attending Anishinabe Academy because “when I was in high school, I never thought about being a doctor.” She also helped mentor American Indian undergraduates from all over the country in a two-day annual workshop that offers introduction to the MCAT, mock interviews, and other skill-building activities for applying to medical school. “I don’t feel like I do enough,” Herrera says, “but I try to do what I can.”

As an undergraduate, **Kyle Williams** met a boy with a rare disorder called PANDAS—Pediatric Autoimmune Neuropsychiatric Disorder Associated with Streptococcus. Among the boy’s symptoms were Tourette’s syndrome and obsessive-compulsive behaviors. Williams became fascinated by the disorder and similar ones such as Sydenham’s chorea, which seem to show a link between certain types of obsessive-compulsive disorders and strep. Now a second-year medical student, he’s doing work that may help researchers better understand such disorders. He and microbiologist Patrick Schlievert successfully submitted a grant proposal for a Howard Hughes Medical Student Fellowship to study the pathogenesis of these diseases. His findings, which suggested ways that certain bacteria could cause an autoimmune disorder, were significant. He earned two awards for his work at a conference last year for grant recipients: one that paid for a second year of study and another that will pay for the rest of his medical school costs. He is the first University of Minnesota student to earn either award. Williams hopes his work will extend further. “We may have found a mechanism as to how bacteria can cause an autoimmune disorder, and people have been looking for the pathogenesis of that for a long time,” he says. “That’s a much bigger question we’d like to tackle.”

CLARION, a student-founded organization that promotes communication among health professionals to improve patient safety, is ahead of the curve, says **Leslie Carranza**, a former board member. The organization was founded five years ago; its most prominent activity is a case study competition of sentinel events. This spring, that case study competition extended its reach nation-



SCOTT STREBLE

Shannon Herrera and grandfather Alfredo Gabriel Herrera

ally, with student teams participating from the University of Minnesota, University of Missouri, University of Chicago, University of Tennessee, University of Connecticut, and University of Wisconsin-Madison. When Carranza, who had previously earned a master's degree in public health and worked as an administrator in a hospital, entered medical school, she understood how important it was to have a broad perspective. She quickly became one of the organization's most active members. She estimates that some 200 students from such University of Minnesota programs as nursing, pharmacy, and health care administration have gotten involved in CLARION in some capacity. Now busy with her rotations, she says the background she gained through CLARION makes her a better doctor. "I know what I can ask nurses and how they can help me," she says. "I understand how all the pieces fit together." While CLARION's goals are lofty, Carranza says the competitions and other activities to promote communication among future health professionals are making a real difference. "If we all worked better as a team, and we all understood each other a little bit better, we might solve some problems," she says. "It's not a unifying answer to all the problems in health care, but it's a start."

Raised in Silver Bay, a small town in northern Minnesota, **Matt Taintor** has long appreciated the importance of rural health care. "Both of my grandfathers were private practice doctors in fairly rural areas," he says. "Hearing stories from them got me excited about it." As the recipient of one of first two Dean's Scholarships at the University of Minnesota Medical School, achieving his goal of becoming a doctor in a rural area got easier. He entered through the Duluth campus program, which has as its mission educating physicians to serve rural areas and Native American communities. The full-ride scholarship will allow Taintor to pursue rural health care without having to worry about paying back more than \$100,000 in loans that he might have otherwise accrued. "I knew [going to medical school] was something I wanted to do," he says. "I just didn't know if it would be financially feasible for me. When I got called about the scholarship, I realized it was meant to be."

Shaquita Bell applied to the University of Minnesota Medical School because of its reputation, but she enrolled at the school because of the people. "They saw me as a whole person," she says. "I wasn't a number, and I was more than just my research interests." Meeting members of the Student National Medical Association (SNMA) as a prospective student, she has since become one of the organization's most active members. Bell currently serves as national membership chair of SNMA, a group whose goal is to increase the number of culturally capable and sensitive physicians. In her role, she helps members communicate with each other, assists local chapters with civil rights and affirmative action issues, and oversees alumni affairs. In addition to projects for SNMA, she's also working on issues that are closer to home. She and another student recently organized a conference that brought together Minnesota's top political, community, and medical school leaders to discuss ways to increase diversity in medical schools. "We wanted to do something here that would make a difference," she says.

He grew up in Little Canada, Minn., but this fall, when **Cuong**

Pham takes part in rotations and research in Ho Chi Minh City and Hanoi, he'll return to his country of birth. The oldest of three siblings, Pham was not yet 2 years old when his mother and father, a former officer in the South Vietnamese army, left Vietnam for political asylum in the United States. Known as "Ku" to his friends, Pham's name means "strong will." He showed that his first year in medical school by founding Harambe, a multicultural arts festival of healing. He also demonstrates that strong will by going to Vietnam

"I think it's time for us
to move on as a nation."
—Cuong Pham

even though his parents have expressed trepidation about him staying in the northern part of the country. "I think it's time for us to move on as a nation," Pham says. As an undergrad, he had an unfocused urge to help. "Vietnam has always been part of the background," Pham says, "so burdened with poverty and lack of education." While a computer science major, he began volunteering at a hospice. He loved talking with patients and "things just started clicking." Now, he's taking a year off to engage in international medical programs. First stop is South Africa, where he will spend two or three months serving a United Nations program offering a new HIV/AIDS treatment for orphans. Then he moves on to Vietnam. He hopes to strengthen ties between the University of Minnesota and medical schools in Vietnam, where each year a couple of medical students visit. Pham would like more to go and he'd like non-Vietnamese to go, too. "My plan is to build a partnership."

Even before she entered medical school, **Gillian Burkhardt** heard about the Phillips Neighborhood Clinic. Brainchild of physician John Song, the clinic would be run by students and serve Minneapolis's poorest neighborhood. "The clinic embodied the reasons why I wanted to be a doctor," she says, "working with all facets of health care and working with an underserved population." A former Peace Corps volunteer in Madagascar who also managed an HIV and STD prevention program overseas, Burkhardt brought a public health perspective as well as concern for those who lack access to the clinic, which opened March 10, 2003. The Phillips Neighborhood Clinic offers poor and homeless people basic health screenings, acute services, and referrals to other health-care providers. Under the supervision of a physician, first- and second-year medical students are joined by students from pharmacy, nursing, social work, and public health. Says Burkhardt, "I've done a lot of my rotations at Hennepin County Medical Center, dealing with the same patient population. I think it's helped give me more understanding and helped me help them." The experience affirmed her commitment to a community-based approach to health care. "I've been an unusual student in that I haven't looked at medicine from a traditional point of view," Burkhardt says. "The University of Minnesota has been a really good place for that."

Spanning the divide between medical doctor and biomedical scientist can be difficult—especially when individual students have to build the bridge themselves, with very little in the way of blueprints. That’s how it used to be in the M.D./Ph.D. program at the University of Minnesota, says John Jalas. He started as a medical student in 1996 and, after two years of primarily classroom work, moved into research on the DNA-changing nature of carcinogens in the laboratory of Stephen Hecht. It was like moving to another world. “The program, the M.D. side and the Ph.D. side were pretty separate,” he says. “So were students in the Ph.D. part—you didn’t feel like you were in the program. You were off on an island.”

invited Peter Agre, a Nobel scientist, for a two-hour audience—and he brought the actual medal,” he says. “That’s a showstopper but we also try to consistently bring faculty to them” so they know that they made the right choice.

Other aspects of the program also reduce isolation. Students are assigned to mentors, a student-organized lecture series has been revived, and students must attend a monthly breakfast get-together. In addition, LeBien and Bitterman are very accessible and responsive to student needs, says student Kristen Schreiber. After finishing her doctoral work last August, she requested a leave for the arrival of her son Leo Schreiber-Wacnik. She will defer medical school for

nearly a year, noting that data shows “nine months is about the critical period for stable attachment and future outcomes.”

Time is of the essence for M.D./Ph.D. students. Pragman notes that she and her fellow students typically begin as “these idealistic, wide-eyed 22-year-olds” who only later realize they will be 30 when they graduate. “At 22,” she adds, “it’s this ‘30, whatever.’ But it starts to mean something different

when you’re 26 or 27.” For her, LeBien and Bitterman’s push to acquaint the M.D./Ph.D. students with role models as well as with fast-track residencies that emphasize research along with clinical skills, have been very helpful.

“LeBien has brought new life” to the M.D./Ph.D. program at the University of Minnesota, noted the authors of its most recent program review. Dean Deborah Powell is a strong advocate of the program, notes LeBien. One of 40 Medical Scientist Training Programs in the United States, the M.D./Ph.D. program at Minnesota has 121 very productive faculty associated with it. The majority of current students work with faculty in either neuroscience or in the matrix of microbiology/immunology/cancer biology.

M.D./Ph.D. refresher course

Connecting the two halves of the program to make it more coherent for students was a major goal for scientist Tucker LeBien when he became director of the M.D./Ph.D. program in January 2003. It was not easy, he says, because this is “the most complicated and challenging educational program in the University.”

One difficulty arises because the cultures of the two parts of the program are very different, says associate director Peter Bitterman, a physician. Medical school is professional training that requires students to master knowledge and develop a high level of skill; he compares it to musicians educated in the performing arts. In graduate school, on the other hand, students are expected to seek mastery to feed their creativity and to develop their own ideas; it’s less like becoming a performer and more like becoming a composer.

“People in the two areas are really smart and dedicated,” Bitterman says, “but the expectations differ.” To ease the transition, he introduced an ambulatory clinic course that brings students in their last year of graduate school into clinical experiences with a physician-scientist for a half-day a week for six weeks. Along with reacquainting them with the medical profession, students can learn from their teachers how to integrate clinical problems with laboratory research.

Their teachers may become role models, as Paul Bohjanen has for student Alexa Pragman, who will enter clinical rotations this fall. “He’s an M.D./Ph.D., who has a half-day clinic, and the rest of the time he spends in microbiology working on his lab research activities,” she says. “He has projects working on HIV and T-cell immunology. He just got back from a month in Africa, teaching African physicians how to use HIV drugs. So he’s really doing just about everything that we as trainees in this program are doing.”

Exposing students to role models is essential, LeBien says. “We

“It’s nice to be an alumnus of a stronger program.”

One of the latter is Jalas, who this spring was scrambling to finish clinical rotations before medical school graduation, while continuing to squeeze in research on carcinogens. Because he was so far along, the changes in the program did not directly affect him. Still, he appreciates that they make a difference for other students. “If anything,” he adds, “it’s nice to be an alumnus of a stronger program.”

This summer, Jalas enters a residency in pathology. “That’s the perfect medical specialty for me—the most time for research.” He matched at University of California, San Francisco. Says Jalas: “Coming out of this program, you can get into anywhere—no doubt about that.”

On the cusp of moving from the classroom into the hospital or clinic setting, the University's second-year medical students gather for Transition Day. "We want to provide students with practical, useful information as they enter patient care units in hospital and clinical settings," says Theodore Thompson, M.D., director of education for years three and four. "We try to help prepare them become active members of the [clinical] team."

Transition Day aims to reduce any anxiety the students may have. Transition Day also allows students from the Medical School's two campuses—the Twin Cities and Duluth—to converge.

There are more than 160 year-two students at the Twin Cities

life no matter where it's at. It will be interesting to go to an area" where, instead of seeing a patient every few hours in a smaller town E.R., "there's going to be a patient every couple of minutes," he says. Brandt-Griffith, Duluth class president, agrees. "It's hard to sit in a classroom every day for eight hours. Finally, we're going to have a little light shed at the end of the tunnel. It's the adrenaline rush of actually knowing you're going to be a doctor."

Before they become doctors, however, there are hurdles to overcome. Lucie Turcotte knows she'll have to address her lifelong phobia of needles. Turcotte, who attends the Twin Cities campus, says, "I'm nervous about blood draws." She's also heard "horror stories"

Moving together to clerkships

campus, while Duluth has about 50. The campus in Duluth (population 87,000) offers a rural- and primary-care centered education for the first two years tailored for students interested in those practices. The Twin Cities campus provides close contact with specialized practitioners in an urban setting (population 2.7 million). Twin Cities and Duluth campus students then come together in the Twin Cities for their clerkship rotations. On Transition Day, students from Duluth travel to the Twin Cities where everyone gathers to learn clinical responsibility and to get to know one another.

Brianne Brandt-Griffith and Ross Perko are finishing their second year at the Duluth campus. They appreciate Duluth's easy-going, small-city lifestyle. Yet both are looking forward to rotations in the Twin Cities. "I'm excited," says Perko. "Now that I know I can get through the rigors of the first two years, life is going to be

about surviving rotations, so she's looking forward to hearing from a panel of third- and fourth-year students attending Transition Day. "Learning what they really do will be helpful."

At lunch, the medical students meet in groups with advisors for years three and four or with representatives of specialties. For many of the Duluth students, this is the first time they've met their advisor. Following lunch, students from Duluth meet with their "buddy" from the Twin Cities for group tours of the campus.

Later, the students break into workshops. Brandt-Griffith and Perko both take a session on emergency room prioritization. After the group is given some basic guidelines about prioritizing patients, the facilitator presents them with eight cases, all of whom enter the E.R. at the same time. "It's your responsibility to triage these cases," she says. They break into small groups, each led by a resident, and together sort out the order in which the patients should be seen.

Brandt-Griffith found that she needed to draw on information learned in class, but it was challenging to implement in this situation. "I feel right now that I've learned the information," she says, "but I haven't used the information. So I'm excited to be able to reinforce that knowledge that I think I have [during rotations]." But, she adds: "I'm scared a little because I know I'll have to use the term 'I don't know' a lot."

These budding practitioners are just beginning the life-long process of medical investigation, of puzzling over questions and discovering answers.



Students participating in Transition Day

Infusing hope

Using umbilical cord blood as a source for stem cells to treat adult patients who do not have family donors is just the latest breakthrough in the several-decade history of Minnesota’s Blood and Marrow Transplant Program. It is a real-life model of bench to bedside clinical investigation, says Adult BMT Program Director Daniel Weisdorf. “We try very hard to develop laboratory-based studies and bring them to clinical trials to help our own patients,” Weisdorf says. “We attempt to integrate laboratory observations with improvements in clinical care and to test them in our own clinical research program. The whole team of laboratory and patient-based investigators is committed to realize the benefits of modern advances and bring new hope to patients we couldn’t help just a few years ago.”

Led by John Wagner, BMT’s scientific director of clinical research, the Minnesota BMT program has been working for several years to expand the effectiveness of umbilical cord blood transplant for adults. Until recently the procedure, which taps a particularly rich source of blood-cell-producing stem cells, has been largely restricted to children because of the limited content of marrow stem cells provided by a single umbilical cord.

But then, in the process of trying to find ways to expand the number of stem cells in a cord blood unit, Wagner and colleagues combined cord blood from two different donors. As reported in the journal *Blood* this past February, they found that the two samples not only provided sufficient stem cells, they also appeared to have a synergistic effect. Every single transplant engrafted—and on average they engrafted far faster than did stem cells from conventional sources. The double transplant also appears to be quite potent in preventing the return of the cancer.

Minnesota has been a leader in the field of stem cell transplant since 1968, when physician-scientist Robert Good performed the world’s first successful bone marrow transplant on a four-month-old boy with an immune disorder. The University has since hosted groundbreaking work in the use of marrow from unrelated donors; helped establish a national BMT registry; and advanced the use of umbilical cord blood as a source of stem cells. To date, BMT Program researchers have performed more than 4,000 blood and marrow transplants, including more than 400 cord blood transplants. BMT is used primarily to treat a variety of cancers, but also for non-malignant disorders such as aplastic anemia, Hurler syndrome, adrenoleukodystrophy, and severe immune deficiency disorders.

In addition to advancing use of umbilical cord blood in adults, the BMT Program has been enhancing BMT and its application to patient care in a number of other areas.

“This is so exciting, providing so many new treatment options for the patients referred here from all over the world,” says John Wagner.

Overcoming GVHD: A major challenge in BMT is graft-versus-host-disease (GVHD), a deadly complication in which the transplant attacks and destroys the recipient’s own cells. Studies led by physicians Bruce Blazar and Margaret MacMillan have shown in animal models that giving immune system cells known as regulatory T lymphocytes reduces risk of GVHD. They are now moving the treatment into clinical trials.

Reducing cancer recurrence: A second focus is on reducing recurrence of cancer after transplant and increasing the number of patients who are cured. In one series of studies, physician Jeffrey Miller and Weisdorf are exploring the use of natural killer immune system cells from a donor to enhance transplant success. In another, physician Linda Burns and scientist

“It worked far better than we ever imagined,” Wagner says. The researchers are now exploring options for tapping the beneficial effects of combining two cords for children’s BMT as well.

This latest breakthrough continues a tradition. The University of



"The whole team of laboratory and patient-based investigators is committed to realize the benefits of modern advances," says Director Daniel Weisdorf, "and to bring new hope to patients we couldn't help just a few years ago." Members of the Blood and Marrow Transplant team include (back row, from left) John Wagner, Charles Peters, Philip McGlave, Arne Slungaard, Linda Burns, Bruce Blazar, Gregory Vercellotti, Claudio Brunstein, Jakub Tolar, Dan Kaufman, Wei Chen, Jeffrey Miller, (front row, from left) Margaret MacMillan, Xianzheng Zhou, Weisdorf, Angela Mortari, and Marcie Tomblyn.

Daniel Vallera are beginning clinical trials using targeted antibodies to deliver radiation directly to cancerous tissue.

Complicated cases: The program is a leader in extending BMT to patients who once would have been denied because they were older or had complicating conditions such as heart trouble or previous extensive cancer therapy. Researchers have developed a technique for reducing the intensity of pretransplant treatment, making it possible for such patients to undergo BMT. Early results are encouraging.

Long-term health: Physician Scott Baker is leading efforts to follow BMT recipients over time to identify long-term health concerns. The information gained, Weisdorf says, will help improve treatment decisions as well as provide insights into how to help recipients stay healthy throughout their lives.

Cord blood supply: In addition to his other efforts advancing the use of cord blood, Wagner served on an Institute of Medicine committee to assess the nation's need for cord blood and help develop a working plan for implementation.

Beyond BMT: As opportunities grow, the program is expanding beyond strict BMT to include other uses of cells to promote health and cure disease. New directions for cell-based therapy include using T cells to combat autoimmune diseases such as lupus and rheumatoid arthritis, and exploring the application of stem cells that give rise to tissues other than blood and bone marrow.

"This is so exciting, providing so many new treatment options for the patients referred here from all over the world," Wagner says. "The impact on the economy of Minnesota and the University could be tremendous."

Innovative partnerships have been the foundation for University of Minnesota Physicians as it has evolved since its founding in 1997. The faculty practice plan's foremost partnership is with Fairview Health Services, which owns the primary teaching hospital. "Our relationship with Fairview as a medical school practice plan is unique," says CEO Roby Thompson, Jr. "It's unique because the medical school practice plan is independent of the teaching hospital but linked to it by formal affiliation agreements."

The resulting relationship is one of interdependency, of mutual support, and, increasingly over the years, of trust between the partners. "I take UMP's problems as mine and they take mine as theirs—so it feels like a true partnership," says Gordon Alexander, Jr., presi-

dent of the Fairview central metro division, which includes University of Minnesota Medical Center, a division of Fairview. "I've been in several hospitals and I've never seen medical staff and administrative staff work together so effectively—not just on meeting each other's needs but on solving thorny complex problems." The sickest patients come to this hospital for treatments, as University of Minnesota Physicians serve as tertiary-care providers for the Twin Cities, the state, and, in some cases, for neighboring states.

reasonable price," she adds. "I believe we do that in a lot of areas but clearly we need to do a better job of demonstrating the quality of our care and then improving the quality." Over the past year, patient satisfaction surveys indicate greater satisfaction with nine of 10 criteria, such as including patient in decisions, staff attentive to needs, and "would recommend to friends and relatives."

Attention to quality in care also includes teaching students and residents. "We need to be able to demonstrate to our students, throughout the whole spectrum of their medical training, the importance of quality," Daniels says. "I always say, you can't teach what you don't do." That concern is central because at its root, University of Minnesota Physicians is the practice plan for the full-time faculty of the Medical School, says Thompson. The goal for 2007, he says, "is to be the optimum academic medical practice and serve as mentors and role models for the students we teach."

The pediatrics residents in a new children's obesity-prevention clinic will see that first-hand, as they strive, patient by patient, family by family, to treat one of the major health issues of the 21st century. This pilot clinic to treat obese children utilizes the team approach, already found sound in cancer care. Physicians from relevant subspecialties, a dietitian, family therapist, exercise physiologist, and R.N. care coordinator will involve the whole family in the treatment. The clinic will allow care providers

from a variety of disciplines to test the latest treatments on a relatively large group of patients and find the most efficacious approaches to preventing obesity.

What's different with this team is the addition of an important player: the payer. "We're working with Blue Cross in working out a new model for paying for that type of chronic-disease, team-based care," says Daniels.

In addition, University of Minnesota is one of 22 academic medical centers to join the Association of American Medical Colleges Academic Chronic Care Collaborative. The initiative is based on the innovative Chronic Care Model, created by physician Ed Wagner of Seattle's MacColl Institute for Healthcare Innovation, which identifies the essential elements of a health care system that encourage high-quality chronic disease care.

The participating institutions will undergo extensive redesign of their chronic care strategies as well as provider education to put the Wagner Chronic Care Model into practice.

Ultimately, everyone involved, from payers to patients, students and faculty who teach the next generation of physicians, are likely to benefit from these new partnerships in chronic care and education.

Combining forces

The partnership extends beyond care. The 650-member practice plan manages the University of Minnesota Medical Center-based ambulatory clinics for Fairview. In addition, the practice plan has invested \$25 million of its revenue since 1997 in areas of mutual benefit with Fairview, such as program development and growth.

Finances remain strong for University of Minnesota Physicians. Revenues grew 21 percent in 2003, the practice plan annually transfers nearly \$20 million to the University of Minnesota Medical School, and funds have been set aside for new initiatives and clinical quality improvement.

A campaign to improve quality is making progress at University of Minnesota Physicians. "The community at large is demanding increased access for their [University of Minnesota Physicians'] incredible skills and to be treated more responsibly," says Alexander. "And they're doing it!"

Patients and payers are seeing cost of care as less important than value of care, says Bobbi Daniels, chief medical officer for University of Minnesota Physicians. "So what we need to do is demonstrate that we can provide great quality at a

We need to be able to demonstrate to our students, throughout the whole spectrum of their medical training, the importance of quality.

“The patient is at the center of this,” says urologic surgeon

Kenneth Koeneman, director of the new Center for Prostate Cancer. “The thought is to have a one-stop center, with comprehensive, compassionate care and the best team of experts.” His vision will be fully realized in August 2005, when the center moves into its new space, but he already is assembling the team of administrators, nurses, medical oncologists, radiation oncologists, and a nutritionist. “Nutritional counseling is important in prostate cancer, for prevention but also to slow progression,” Koeneman says.

At the Center for Prostate Cancer, patients will be able to obtain the best information for their cancer from a multi-disciplinary standpoint, he says, and they also have the opportunity to enroll in clinical trials. Currently, the center has three trials: Two are immunotherapy or vaccine trials to prevent recurrence and the third one is a chemotherapy trial.

The need for treatment is great. Prostate cancer is, after skin cancer, the second most common malignancy in American men. In 2004, it is estimated that more than 230,000 men will be diagnosed with this disease. The risk of prostate cancer increases with age, and some oncologists believe that if men live long enough, 100 percent of them will eventually develop the disease.

A patient facing a diagnosis of prostate cancer may find himself overwhelmed with the wide range of treatment options currently available. In addition, he will need to make some very personal choices, weighing the benefits of a particular treatment against its potential side effects.

Because of the complicated and sensitive nature of this disease, Koeneman believes it is important to offer patients a tailored

Koeneman and his team work closely on each treatment plan. “Treatment can range from simple observation to more radical options, such as surgery and radiation therapy,” he says. For each patient, Koeneman weighs the available data, discusses it with his patient, and tailors the therapy based on his judgment as well as the patient’s preferences.

“It’s important to realize that early stage prostate cancer, in particular, is amenable to cure with currently available treatments,” says Koeneman. Those treatment options vary, depending on the stage of the cancer when it is found and on the patient’s age and health status.

For cancer that is confined to the prostate, treatment may

Fighting prostate cancer

include surgically removing the entire prostate gland or radiation therapy aimed at the pelvic area, or even energy-based therapy, like cryo-therapy. Some patients, especially elderly men or men with unrelated severe medical problems, may choose to have no immediate treatment. If the cancer has spread outside of the prostate gland, however, hormone therapy is most commonly used and may include surgically removing the testicles or giving drugs that reduce the effects of male hormones.

Koeneman’s research also targets better prostate cancer diagnosis and treatment. By understanding the individual patient’s molecular changes and adapting therapy to that person, he hopes to better control the disease. “We believe that one day we’ll be able to manage prostate cancer much in the way we manage diabetes or hypertension today,” says Koeneman.

While many drugs that target prostate cancer at the molecular level are still in the research phase, initial findings appear promising, says Koeneman. “Decreased growth rate of the tumor and reactivation of programmed cell death in the cancer are on the cutting edge of advancements in prostate cancer management.”

While working to maximize the chances of cure through increased understanding and new technology, Koeneman and his team continue to offer comprehensive care. “The Center for Prostate Cancer offers a new, multidisciplinary and comprehensive approach to prostate cancer,” says Pryor. “We believe the use of pioneering treatments from medical oncology, radiation therapy, and urologic surgery will change how we treat prostate cancer and make a real difference in those with prostate cancer.”

“We believe that one day we’ll be able to manage prostate cancer much in the way we manage diabetes or hypertension today,” says Kenneth Koeneman.

approach to care. As director of the University’s Center for Prostate Cancer and Dougherty Family Chair in Urology, he leads an interdisciplinary team of health-care providers who offer a comprehensive range of services—from prevention and screening to the latest in minimally invasive, robotic surgery.

Understanding fostered by Koeneman’s research adds another dimension to the patient’s care. The head of urologic surgery Jon Pryor says: “Dr. Koeneman’s work on novel molecular drugs targeted at prostate cancer may herald the day when advanced prostate cancer is a curable or treatable long term malady, rather than an eventual death sentence.”

Partners in research

Starting in early 2003, researchers at the University of Minnesota and the Mayo Clinic have cooperated through the Minnesota Partnership for Biotechnology and Medical Genomics. The partnership is a collaborative venture among the Mayo Clinic, University of Minnesota, and State of Minnesota. It seeks to position Minnesota as a world leader in biotechnology and medical genomics applications that will result in important new medical discoveries, thereby improving health care for patients, and supporting the development of new business and jobs in Minnesota.

The first four research collaborations were chosen in early 2004; they focus on prostate cancer, Alzheimer's disease, obesity, and heart disease. By the terms of the partnership, none of these

investigations could be done by one institution on its own. So far, the researchers have submitted five papers to major journals and filed one patent application.

Launched with the encouragement of Minnesota's governor, Tim Pawlenty, the partnership continues to receive state support. This spring, the legislature authorized and the governor signed \$21.7 million in state bonding authority for a three-story laboratory to support medical genomics research. Currently, neither Mayo or the University of Minnesota has lab space available; this opportunity to add lab space to a building in Rochester is essential. For more details on the Minnesota Partnership, see the Web site: www.mayouminnesotapartnership.org

Partners in education—affiliated institutions and health systems

Essential partners in medical student education include hospitals and their staff in the Twin Cities and Duluth. Education in ambulatory care also takes place with the help of adjunct faculty who work in clinics associated with local health systems as well as in independent clinics throughout the Twin Cities metropolitan area and in Duluth.

- Abbott Northwestern Hospital, Minneapolis**
- Allina Hospitals & Clinics, Twin Cities**
- Anoka Metro Regional Treatment Center**
- Children's Hospitals and Clinics, Minneapolis and St. Paul**
- Fairview Health Services**
- Fairview Southdale Hospital, Edina**
- Gillette Children's Specialty Health Care**
- Health East Care System, Twin Cities**

- Health Partners, Twin Cities**
- Hennepin County Medical Center, Minneapolis**
- Methodist Hospital, St. Louis Park**
- North Memorial Medical Center, Robbinsdale**
- Park Nicollet Health Services, Twin Cities**
- Regions Hospital, St. Paul**
- Ridgeview Medical Center, Waconia**
- St. John's Hospital, Maplewood**
- St. Joseph's Hospital, St. Paul**
- St. Luke's Medical Center, Duluth**
- St. Mary's Duluth Clinic**
- United Hospital, St. Paul**
- Unity Hospital, Fridley**
- Veterans Administration Medical Center, Minneapolis**

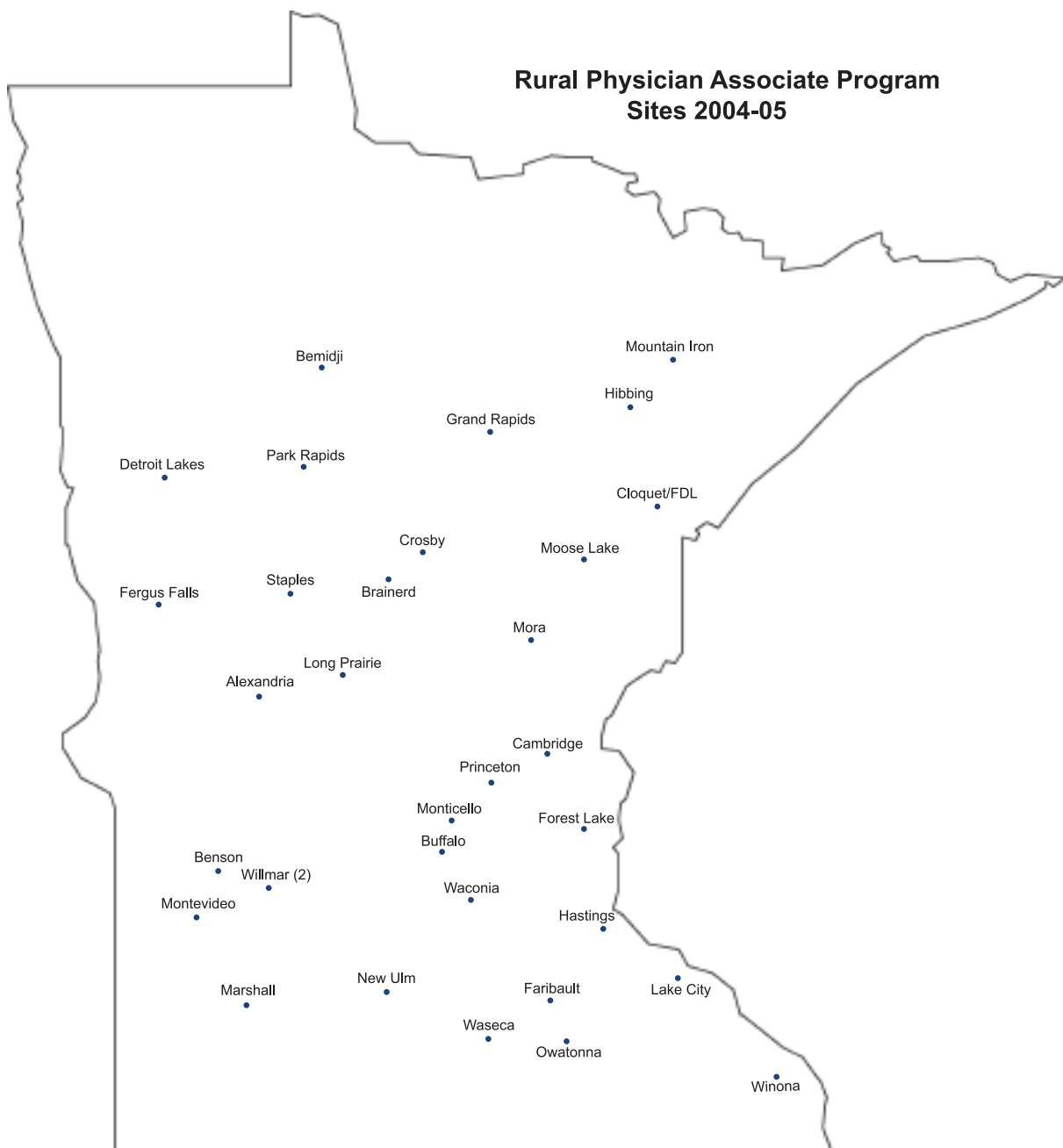
Partners in care and education

The University of Minnesota Medical Center, Fairview, and its University of Minnesota Children's Hospital, Fairview, bring together faculty, physicians and research scientists of the University with the services of community physicians to provide care ranging from prevention and primary care to treatment of complex conditions.

The medical center has nationally and internationally known programs in cancer care, transplantation, and other specialties, a long list of medical "firsts," and is ranked each year among the nation's top hospitals in *U.S. News and World Report*.

The medical center's two campuses are located across the Mississippi River from one another in Minneapolis.





Partners in education—Rural Physician Associate Program

Founded in 1971, the Rural Physician Associate Program has engaged hundreds of health care providers in communities around the state in educating future physicians who intend to practice in small towns and rural areas. “The truth is that RPAP makes these students better doctors,” says physician Gwen Halaas, who heads the program. She cites the length of time spent in one area, as third-year students who live in these communities for nine months gain continuity and intensity of learning experiences with preceptors, pharmacists, nurses, home care aides, and, most importantly, patients.

These students may meet a patient in a clinic or hospital, learn about the difficulties she had getting there and then, on second visit, find out she cannot afford her medication. “They even go to

their homes,” says Halaas. “Sometimes, they go to their funerals. They experience the journey.”

These medical students—34 were accepted into the RPAP program this year—also become a resource, says David Freeman. Freeman is an RPAP alum, whose practice based in Staples, Minn., annually hosts RPAP students. They give talks about science to the elementary school children or attend high school sporting events to help with sports medicine. Even in his small community, he notes, these medical students work with eight physician preceptors. “They will get an idea that in medicine, it’s kind of like a tree. The branches and the trunk are the same but the leaves are a little different,” Freeman says. “They can choose the style they want to be.”

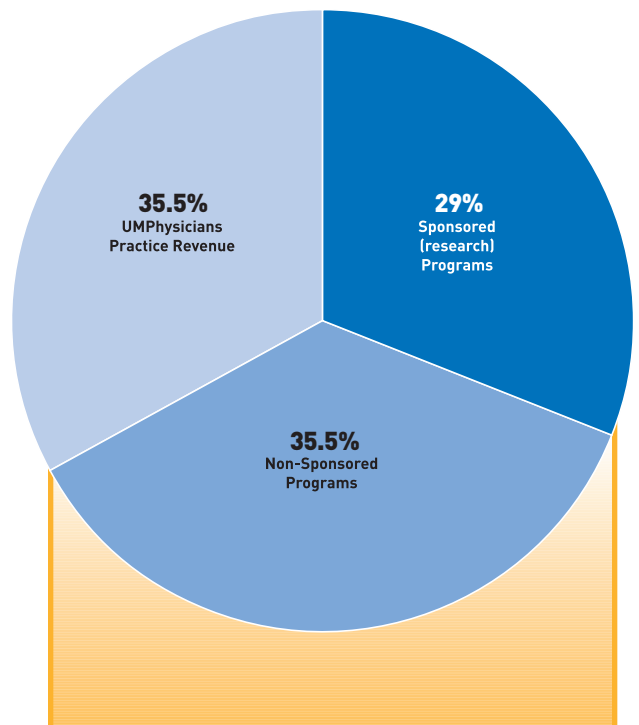
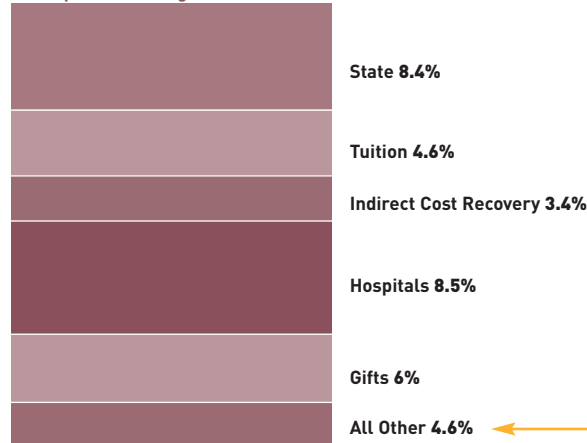
The University of Minnesota Medical School benefits from the support of the state of Minnesota, which has designated funds for faculty recruitment; from transfers from the faculty practice plan, University of Minnesota Physicians; and from the Minnesota Medical Foundation. In fiscal year 2004, the Minnesota Medical Foundation raised \$30.3 million from 14,450 donors for Medical School programs. Gifts directed to research supported hundreds of faculty projects, while earnings from endowments and outright gifts provided more than \$1.3 million for 538 student scholarships.

Medical School Funding

University of Minnesota Medical School Major Funding Sources, Fiscal Year 2004 Budget = \$515 million

Includes UMPhysicians revenue

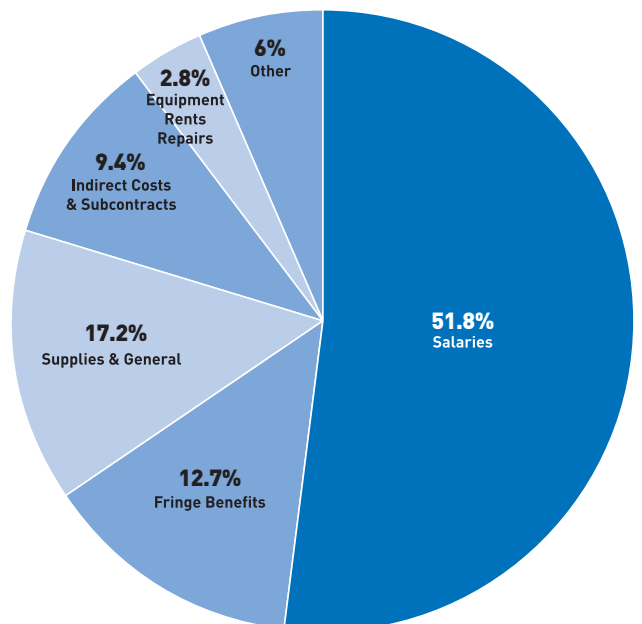
Non-Sponsored Programs Breakdown



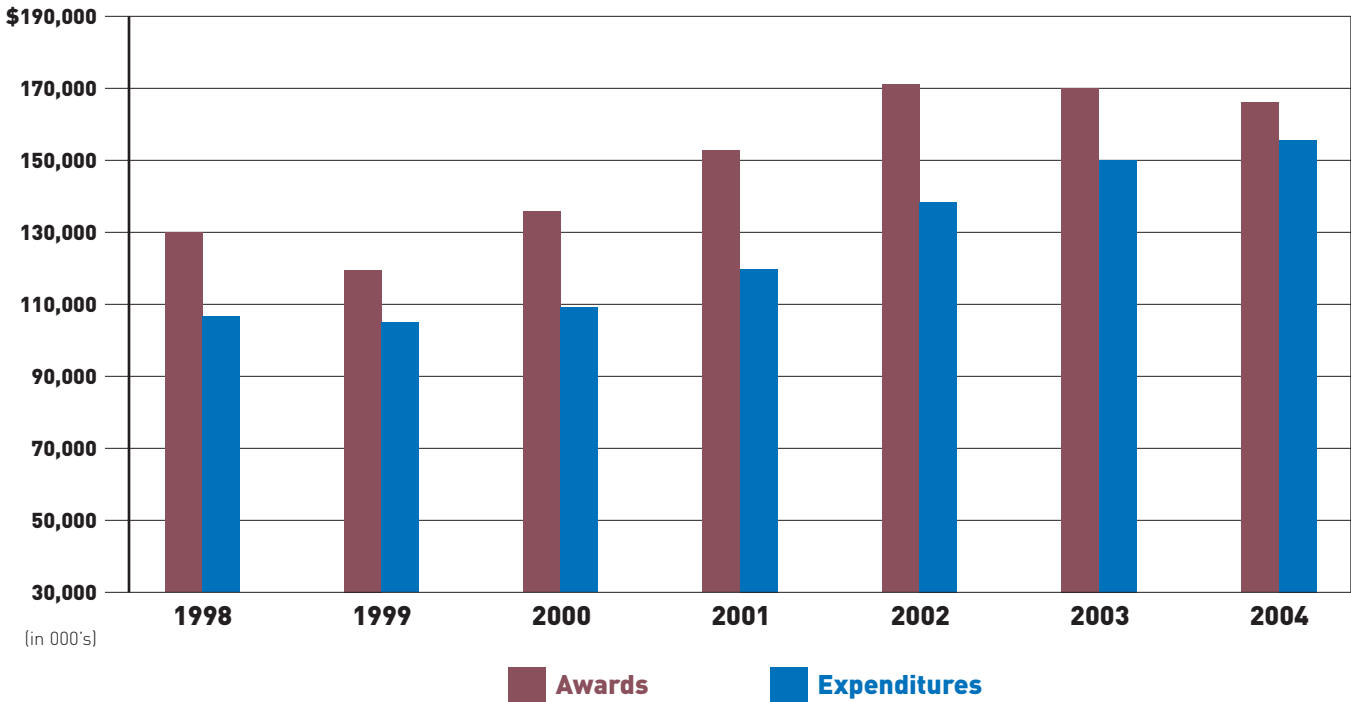
Medical School Spending

University of Minnesota Medical School Expenses Fiscal Year 2004 Budget = \$513 million

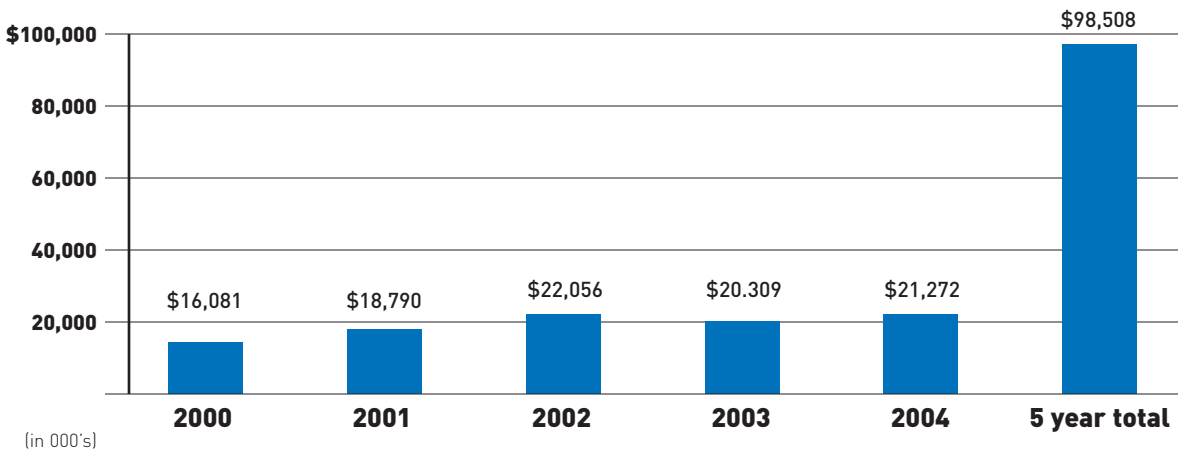
Includes UMPhysicians



Medical School Sponsored Research



Minnesota Medical Foundation's Disbursements to the Medical School



MEDICAL SCHOOL DEAN'S OFFICE

C607 Mayo

MMC 293

420 Delaware St. S.E.

University of Minnesota

Minneapolis, MN 55455

(612) 625-4949

www.med.umn.edu

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