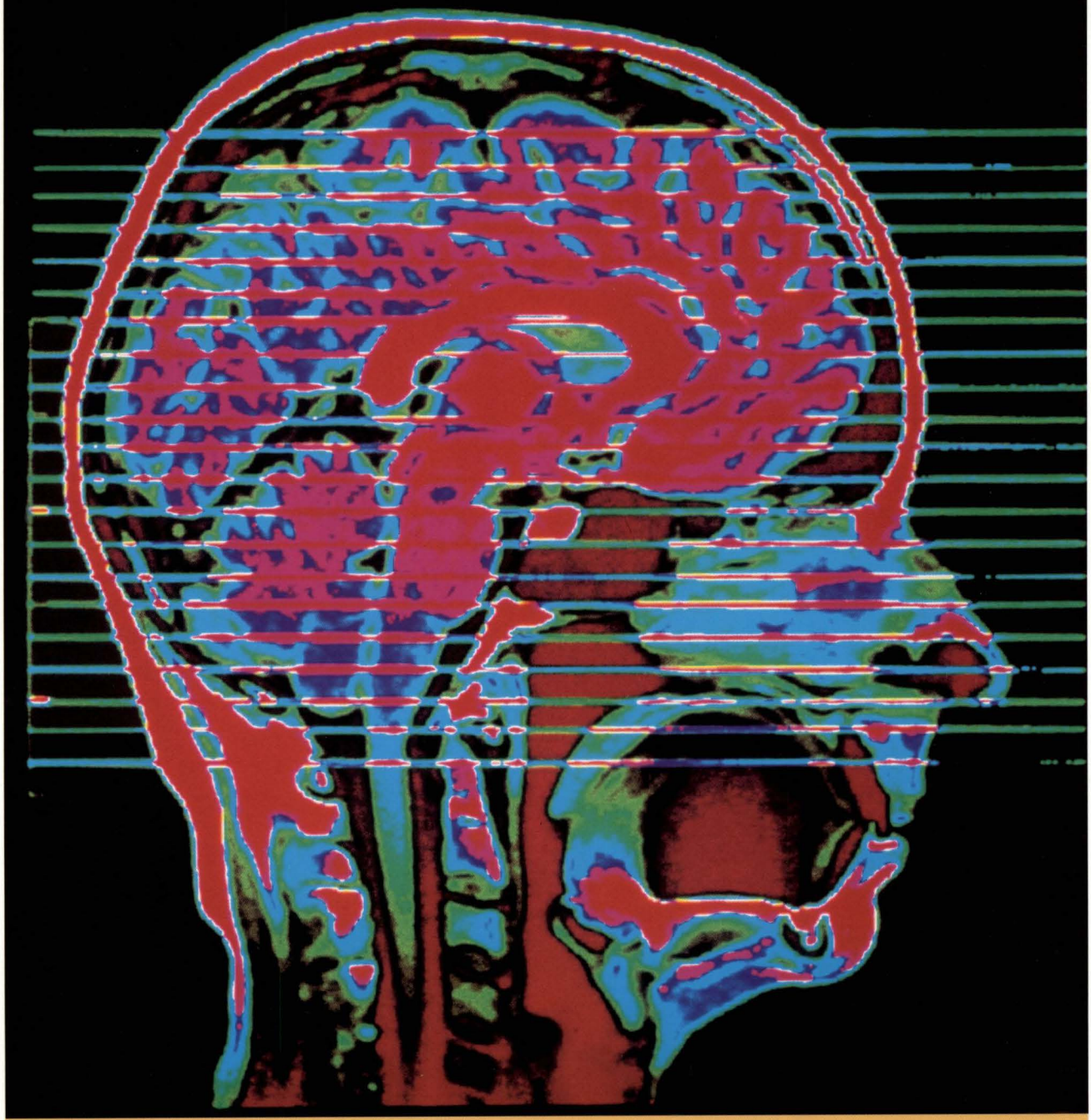
Medical Bulletin

A PUBLICATION OF THE MINNESOTA MEDICAL FOUNDATION • SUMMER 1999

BRAIN STORM

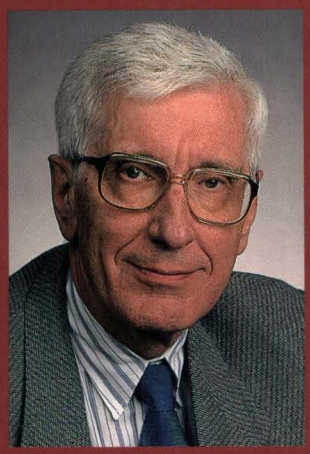
University of Minnesota neuroscience researchers are attacking diseases of the brain



MINNESOTA MEDICAL FOUNDATION

at the University of Minnesota

THE MISSION OF THE MINNESOTA MEDICAL FOUNDATION IS TO IMPROVE THE QUALITY OF LIFE FOR THE PEOPLE OF MINNESOTA, THE NATION, AND THE WORLD BY SUPPORTING THE ADVANCEMENT OF HEALTH-RELATED EDUCATION, RESEARCH, AND SERVICE AT THE UNIVERSITY OF MINNESOTA.



DEAN'S REPORT

This month, 233 medical students completed their training at the University of Minnesota Medical School and are embarking on careers in their chosen specialties. The world of medicine they enter is changing at a remarkable speed – and they will be faced with challenges, discoveries, and rewards they can scarcely imagine today.

What will they confront? A world where long-hidden mysteries of the brain will be unlocked, where discoveries in the world of cellular and molecular biology will translate into exciting new therapies, and where deciphering of the human genome will give researchers the tools to cure many diseases and prevent many others. They will need to constantly expand their knowledge base as new ideas are tested, research breakthroughs made, and new treatments discovered.

Who will they treat? An increasingly diverse population where a profusion of cultures may challenge their traditional training and require them to be sensitive to alternative ways of healing, where preventive medicine will need to be taught in many languages, and where ethical issues ranging from reproductive technologies to end-of-life questions must be addressed.

How will they practice? In a global setting, where small and large nations must join together to conquer disease, and in a regional setting where they must have a working knowledge of state and federal regulations, business practices, patient rights, and managed care.

What won't change? The compassion and commitment brought to the patient's bedside, unchanged as each generation of students graduates and begins practice, and the diligence and skill with which they pursue medical research, following in the footsteps of those who have gone before.

We are extremely proud of our 1999 graduates, and wish them well as they begin their medical careers. We welcome them to the ranks of more than 10,000 Medical School alumni, and look forward to a lifelong relationship with each one. It is a great privilege to help relieve the human suffering caused by disease, whether in the lab or in the clinic, and we know the rewards will be many.

Alfred F. Michael, Dean
University of Minnesota Medical School, Twin Cities

UNIVERSITY OF MINNESOTA MEDICAL SCHOOLS

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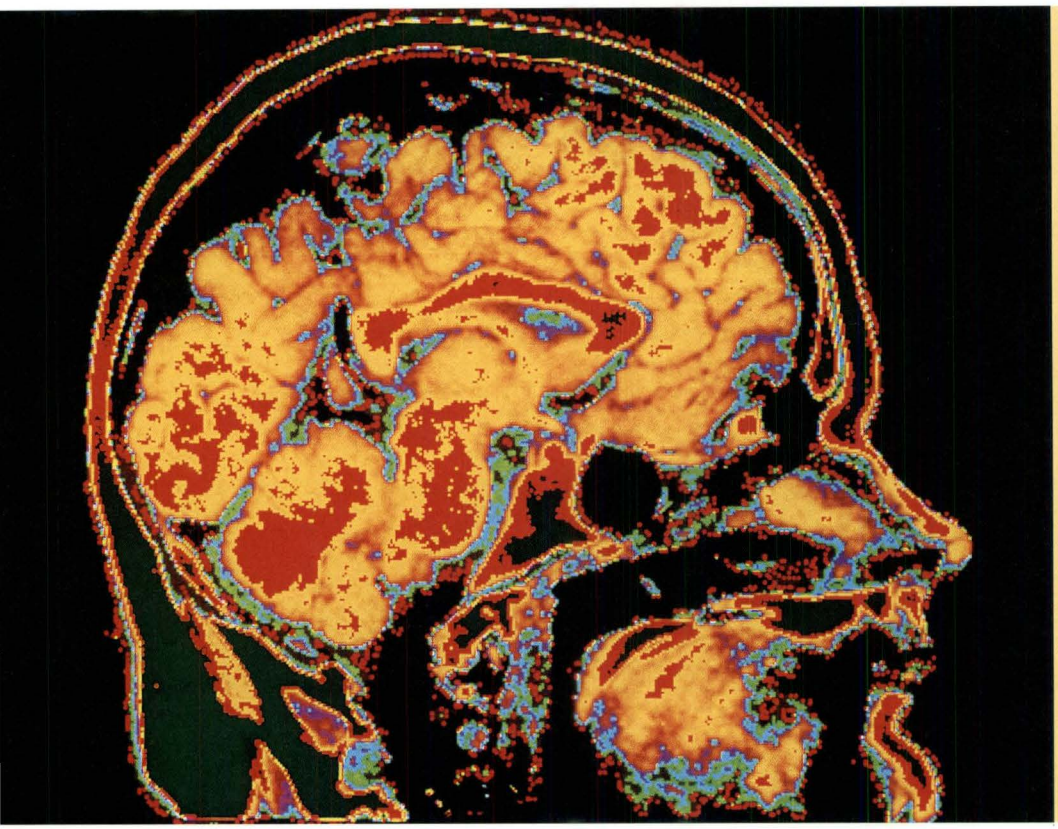


THE NEW NEUROSCIENCE DEPARTMENT SEEKS ANSWERS THROUGH COLLABORATION

The brain is the basis of all our behavior, our emotions, our thoughts, our movements. Diseases related to it cost the United States economy $600 billion a year, and affect one quarter of Americans during their lifetimes. Knowing how it works is critical for humanity to understand itself. But it remains one of the great mysteries of the human body, only slowly yielding up its secrets.

The brain is under attack by researchers at the University of Minnesota's Department of Neuroscience, which becomes official July 1, established in response to the compelling need to understand the functioning of the human brain.

The department brings together faculty from many disciplines – neurosurgery, neurology, physiology, laboratory medicine and pathology, radiology – who are involved in basic neuroscience research, facilitating interactions, collaborations, and research funding opportunities.

"The new department takes a group of faculty who have similar research and educational missions and consolidates those missions," says department head Tim Ebner, M.D., Ph.D. "Being a department also enables us to strategically plan for the future of the neurosciences at the Medical School. We can evaluate our needs, hire new faculty, and together have a much greater impact on understanding the brain and the diseases that affect it."

Initially the department will include about 25 faculty; 10 more will be hired in the next few years. Ebner says the emphasis in the beginning will be to hire new faculty who have strengths in cellular and molecular neuroscience – researchers with the potential to have a significant impact on deciphering neurological disease at its most basic level.

"Neuroscience is a field that spans all the other fields," says Ebner. "You have to address the study of the brain from understanding the basic molecules, to how those molecules function in brain circuits and brain systems, to how brain activity is translated into behavior. It spans all the scientific disciplines from basic molecular biology to the cognitive neurosciences – the highest processing of the brain. We are bringing faculty and students together, providing the breadth to really attack the problem

S T O R M

of understanding the brain."

Most of the neurosciences faculty will eventually be located in what has been dubbed "research row," a three-building complex consisting of a newly renovated Jackson Hall, the recently completed Basic Sciences and Biomedical Engineering Building, and the planned Molecular and Cellular Biology Building.

Ebner underscores the critical need to increase the pace of neuroscience research. "Everything we do is a function of the brain," he says, "and because there are more diseases of the brain than any other system of the body, we must understand it better. There's hardly anyone who hasn't been touched in some way by conditions like Alzheimer's, Parkinson's disease, strokes, epilepsy, and schizophrenia."

Neuroscience faculty member Kamil Ugurbil, Ph.D., agrees. "I think the establishment of a Department of Neuroscience is very important. I rely on collaboration with faculty in the areas of brain function, pathology, and chemistry. In this field, no single scientist can control all aspects of the research – it is a very collaborative and interactive process involving physicists, neuroscientists, and various biomedical researchers."

Neuroscience faculty members at the Medical School are already making major strides in understanding how the brain works. Studies underway by five scientists and their colleagues illustrate the extraordinary complexity of this unique organ, and the interaction that is helping bring the puzzle pieces together.

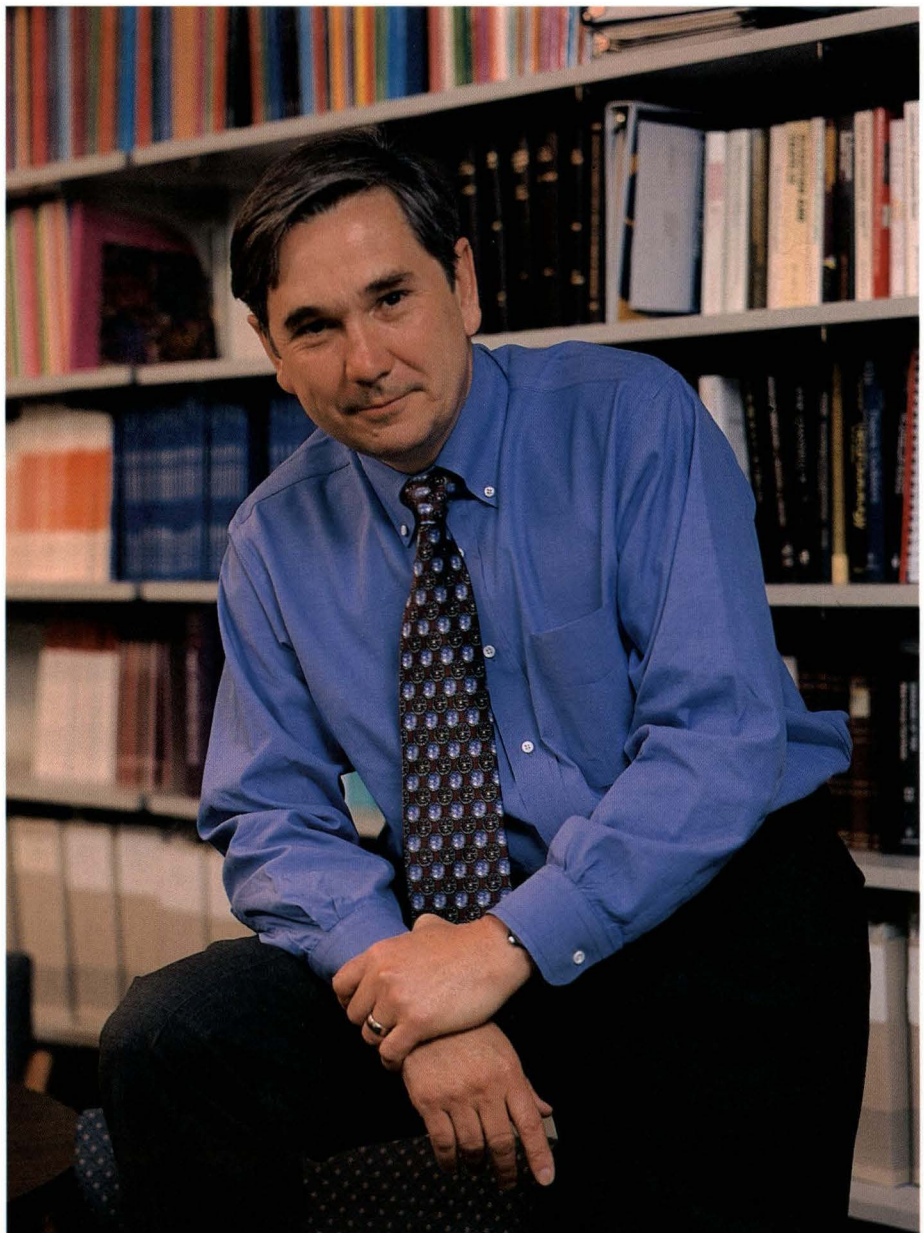
UNDERSTANDING MOVEMENT:

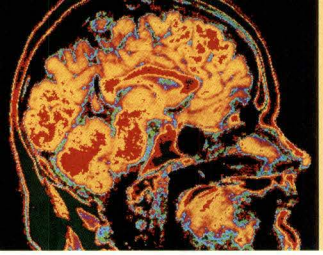
Timothy J. Ebner, M.D., Ph.D.

Every day we perform thousands of tasks involving movement, without thinking about how each task is accomplished. We walk, speak, eat, dial a phone, step on the brakes. Generating these movements is one of the primary functions of the brain, and to understand it all it is necessary to go back to the most basic level.

"Our laboratory is trying to understand how single neurons and populations of neurons encode the information needed to make and control movements," says Tim Ebner, M.D., Ph.D., professor and head of the Department of

Tim Ebner, M.D., Ph.D., is head of the new Neuroscience Department and holder of the Maurice Visscher Land Grant Chair in Physiology.





Neuroscience. "Our goal is to decipher how the brain formulates a plan and how it then executes that plan."

He and his colleagues are investigating neuronal activity in the cerebellum and cerebral cortex, studying a wide range of actions such as reaching, tracking moving targets, learning new visuomotor relations, and hand movements. "Using powerful analytical and statistical techniques, we then sort out how information about movement parameters is embedded in the neuronal discharge," Ebner explains.

He employs a variety of methods to understand how different areas of the brain function, including optical imaging. "With these techniques we are able to construct detailed spatial and temporal maps of the neuronal activity in the cerebellar cortex," he says.

The research is important since many diseases of the brain such as strokes and Parkinson's disease eventually affect movement. "What we're doing is at the very basic level," says Ebner, "but we're trying to figure out how these systems work, because with that basic information there is the possibility that in the future you can manipulate or replace those damaged systems to help restore lost function."

Ebner points out that an exciting element of basic research – greatly enhanced through the increased opportunity for collaboration – is that discoveries in one area can have an impact on many other projects. "For example," says Ebner, "researchers studying movements have worked out the circuit in the basal ganglia – the area of the brain that affects Parkinsonism. Though the work was never directed specifically at therapies for Parkinson's, by understanding how it works we now know how to direct therapies toward manipulating that circuit. In so many unexpected ways, basic science discoveries have a major impact on how we eventually diagnose and treat disease."

By Jean Murray

EXPLORING THE BLOOD/BRAIN RELATIONSHIP:

Costantino Iadecola, M.D.

Suddenly your vision blurs, you can't find the right words for common objects, and your left side is numb. These are a few things that can happen very quickly when the blood supply to the brain is cut off for even a short time.

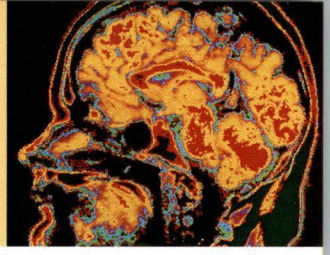
Costantino Iadecola, M.D., professor of neurology, is exploring several aspects of ischemic damage – the harm that is done when blood supply is cut off. With the support of five National Institutes of Health (NIH) grants, his research ranges from examining the brain as a whole to studying specific molecular events.

"Early on, stroke is a vascular disease. Then, after the damage begins, it becomes a brain disease. Two of the grants are focused on stroke," says Iadecola. The first NIH grant was given to study nitric oxide and brain injury. "After a stroke, there is more of this molecule than there should be. We want to know why this is and how it happens," he says.

The second grant is being used to study a new enzyme, cyclooxygenase-2, and its role in stroke. This enzyme makes prostaglandin, a major factor in inflammation. "We are looking at the role of the enzyme in the very early stages of ischemia, during a stroke," says Iadecola. "Once we know what it is doing to the brain, we can determine if it is good for it. If not, we can block it after a stroke."

Blood vessels in the brain may also be involved in Alzheimer's disease. With another NIH grant's support, Iadecola is exploring a new idea that in dementia, blood vessels are not working properly and this leads to deterioration of the neurons. "When there is neural activity, the neurons talk to each other. When they talk, they need more glucose and oxygen to work and so they need more blood flow," explains Iadecola. "Because of this mechanism, blood flow regulation, we can identify brain regions which are activated with functional magnetic resonance imaging."

Blood flow is also the theme of other studies. The relationship between blood flow and neural activity is complex. Iadecola hopes to learn more by identifying brain activity with functional imaging. "We really don't understand why the brain is so sensitive about blood flow. Why do you need such a fastidious, complex system to regulate blood flow?" says Iadecola. "If we understand that, we can develop



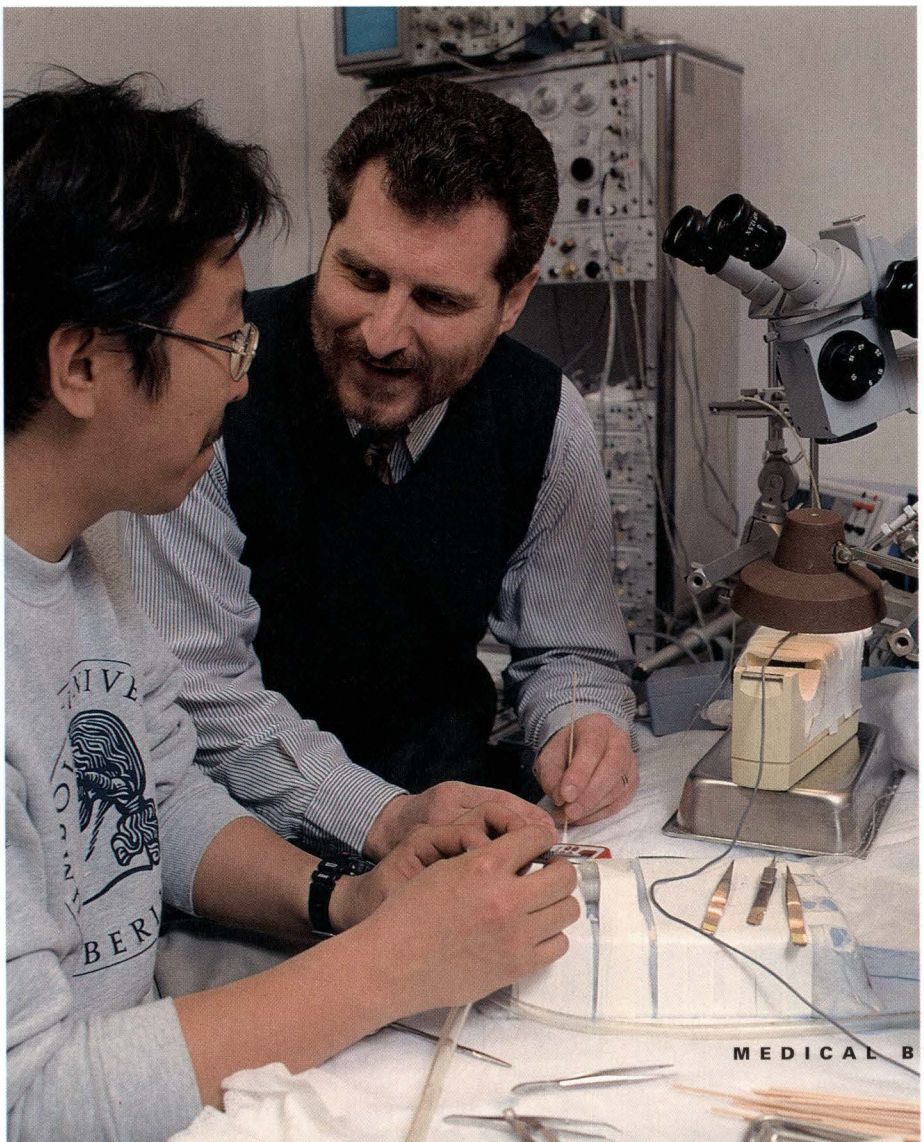
ways of increasing blood flow to prevent further damage in situations like stroke."

This field has not yet focused on the cellular level, says Iadecola. "If you want to know what turns on blood flow when the neuron fires, how are you going to do that? We came up with the idea of using transgenic models. We have models that lack a certain cell, a certain neuron. Then we can study the role of that particular cell in blood flow regulation. We are moving the field to a more cellular level, using transgenic-based technologies. We can now ask questions that couldn't be addressed with traditional approaches. We are one of only a few, maybe 10, labs like this in the United States."

These studies and methods could unlock many answers to how the brain works and the role of blood flow in stroke, Alzheimer's, and other neurodegenerative diseases.

By Jodi Ohlsen Read

Costantino Iadecola, M.D., and post-doctorate fellow Kiyoshi Niwa, M.D., are studying blood flow regulation in the brain.



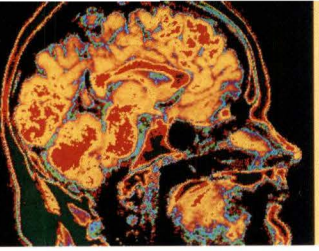
ANALYZING BEHAVIOR:

Apostolos Georgopoulos, M.D., Ph.D.

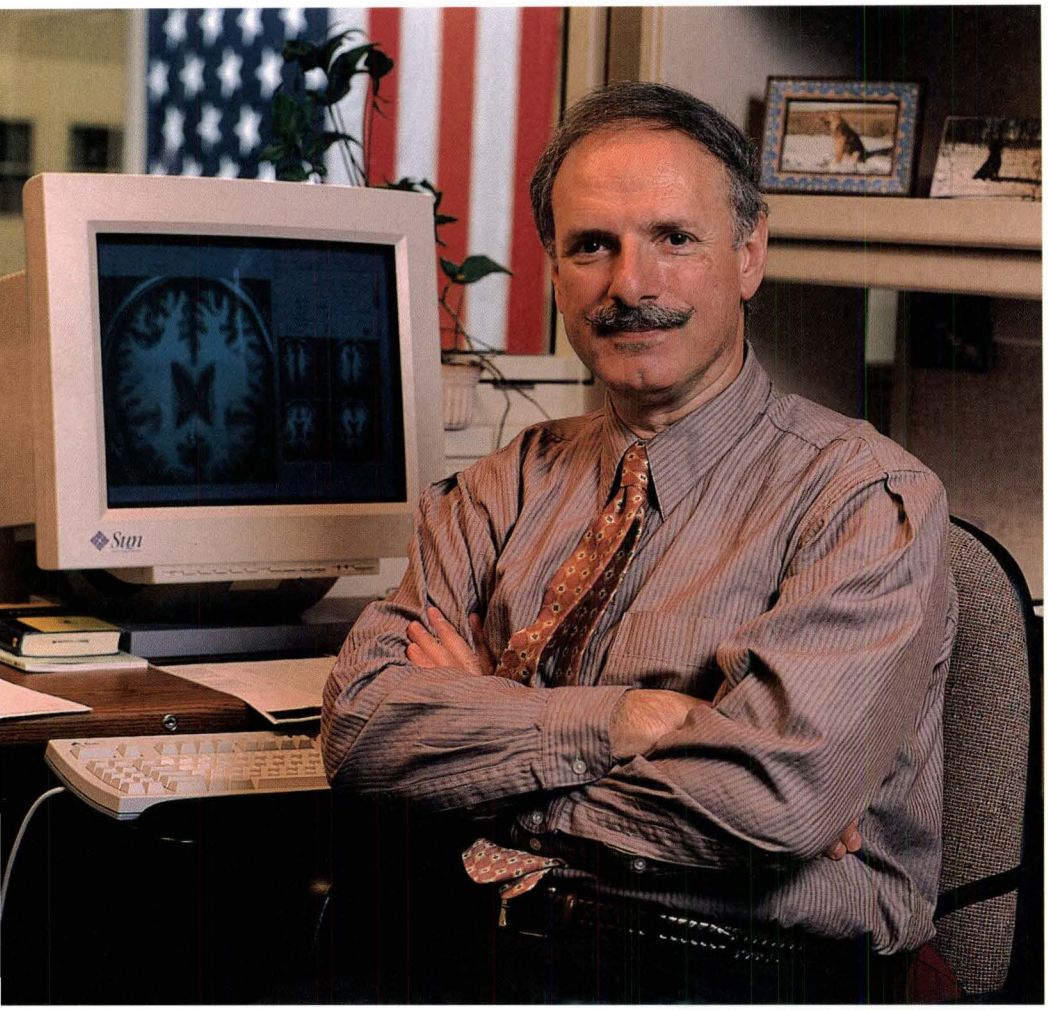
Understanding how the human brain functions seems like a tall order, but it's one Apostolos Georgopoulos, M.D., Ph.D., professor of physiology, neurology, and psychiatry, tackles every day. "We want to know how the brain works – everyone wants that," he says. "Our goal is to understand how specific behavior is being processed by the brain. To do that, we look at the information processing by brain areas – individual cells, small aggregates of cells, cell models, etc."

All behavior, whether it's making a fist or solving a problem, is the result of brain function. Individual cells and cell groups work together to accomplish a specific task, such as generating a movement or solving a puzzle. The cells emit neural impulses, which are like a type of Morse code. "We decode the activity," says Georgopoulos, "then we impose different rules on the generation of movement. By using the code we have discovered, we interpret and understand the processes by which the problem is solved."

The research focuses on two aspects of behavior: motor function and the cognitive processes that lead to action. Georgopoulos, who is located at the VA Medical Center, monitors brain activity of humans



BRAIN STORM



Apostolos Georgopoulos, M.D., Ph.D., examines brain activity on his computer screen in his office at the VAMC. He is holder of the American Legion and American Legion Auxiliary Chair in Brain Sciences.

and primates solving different problems on computer screens, like navigating a maze or copying a simple shape without tracing it.

"We do a task with human subjects and study them with a functional MRI," he says. "Then we do the exact same task with monkeys and study the activity of single cells and smaller ensembles of the brain cells where they're processing these tasks. By looking up behavioral data or psychological studies, we have been able to show that humans and monkeys solve their problems in the same way and have a direct visualization of specific processes from the actual neural data."

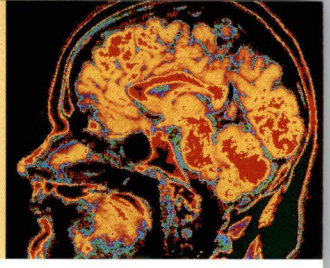
Ultimately, Georgopoulos hopes to be able to predict behavior in humans and animals by proper interpretation of neural data. "The ultimate goal, and we have achieved this a few times, is to be able to predict which way the monkeys would solve a problem by deciphering ongoing neural events."

Interpreting the neural impulses underlying the cognitive mechanisms in the brain has potential benefits to patients in a number of areas. "Having a general understanding of how different brain areas work together for a function can lead to an understanding of brain reorganization after disease," Georgopoulos says. For instance, knowing how the brain works after a stroke can help doctors adapt a regimen of physical therapy that will maximize what function remains.

In another research study, brain modelers in Georgopoulos' team have developed a device that processes brain signals in an artificial neural network and translates them into commands that could drive a prosthetic device. "For example, an amputee could think about how to move an artificial limb and the device will interpret those neural signals," he says. "Currently we're controlling a robot like that, and hope to develop the device soon for human application."

Because the brain is such a complex organ, interdisciplinary collaboration is a vital component of research. Georgopoulos collaborates with a number of different University researchers. "You definitely get a more rounded and more appropriate understanding of the function of the brain mechanisms by looking at it from different perspectives," he says. "We encourage communication as much as we can."

By Andrea Bie



SPIN PHYSICS – A CLOSER LOOK THROUGH MR IMAGING:

Kamil Ugurbil, Ph.D.

Vivid colors light up areas of the brain image on the computer screen. Green fades out as another purple spot brightens because the patient just began talking. This is live action, and it doesn't hurt a bit. The patient is lying calmly inside a cylinder, surrounded by a magnetic resonance imaging machine.

"Magnetic resonance is a fantastic field," says Kamil Ugurbil, Ph.D., professor of biochemistry, radiology, and medicine. "Using 'spin physics' – manipulating the nuclear spins with the magnet – to extract information about the human body is fascinating."

Magnetic resonance (MR) imaging uses a magnet to get an image of the human body, often the brain, without using invasive methods. It is routine for hospitals to use MR for diagnosis when someone has symptoms such as severe headaches or back injuries. In general, hospital MR scanners operate at magnetic fields ranging from approximately 0.2 Tesla (unit measurement of magnetic field) to 1.5 Tesla. At the University's Center for Magnetic Resonance Research (CMRR), the magnets operate at 4 Tesla to 9.4 Tesla.

"We were one of the first labs, one of three in the United States, to push into this realm of using high magnetic fields to obtain information from the human body," says Ugurbil. "In 1991, we acquired a state-of-the-art 4 Tesla magnet, large enough to accommodate the human body. We quickly evolved as a major laboratory for high field research and we are now funded by NIH as a national research resource center.

"The work we have done with humans at 4 Tesla has been extremely successful. We also have higher field magnets. We are setting up a 7 Tesla magnet that is capable of holding humans," continues Ugurbil. "This is a unique frontier and we expect this year to be able to start gathering more new information."

The possibilities for this technology are broad. "We try to obtain information on brain function, brain chemistry, and physiology. These categories cover a tremendous number of topics and problems," says Ugurbil. "We first pursued mapping brain function to find out whether the brain has designated certain spatially contained areas for particular functions. Identifying those areas is an important process in neuroscience research. And, we've already shown that going to higher magnetic fields we get better contrast. We can detect weaker changes or trade that for increased spatial resolution."

Ugurbil also studies brain chemistry, detecting signals from many chemicals in the brain and monitoring them separately. "Detecting

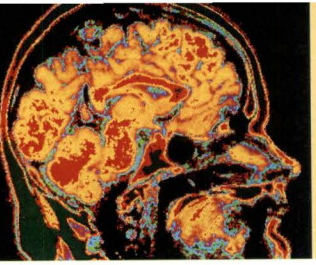
UNIVERSITY OF MINNESOTA AND THE MAYO CLINIC:

Collaboration will benefit the state

An era of closer collaboration between neuroscientists at the University of Minnesota and the Mayo Clinic was launched in March with the Neurosciences Symposium, held in Rochester. The event marked the first time faculty formally detailed their research findings for each other, as a result of University President Mark Yudof's desire for the institutions to use their collective research efforts to benefit the state.

Dr. Charles Moldow, associate dean for research at the University, coordinated the event. "The neurosciences network in Minnesota has become a real powerhouse," he said. "The symposium was an opportunity for both institutions to showcase their efforts and make connections that will benefit all of us."

University of Minnesota Medical School faculty who participated in the program included Neuroscience Department head Tim Ebner, *Neurosciences at the University of Minnesota: The Present and Future*; Apostolos Georgopoulos, Physiology, *Brain Mechanisms of Cognitive Processes*; Costantino Iadecola, Neurology, *Molecular Pathology of Ischemic Brain Injury: From Bench to Bedside*; Harry Orr, Laboratory Medicine and Pathology, *Neurodegenerative Diseases from the Gene to Pathogenesis*; and Kamil Ugurbil, Radiology, *Imaging Brain Functions.*



BRAIN STORM

Kamil Ugurbil, Ph.D., uses magnetic resonance imaging to get images of the human brain. He is holder of the Margaret F. and Harold O. Peterson Chair in Neuroradiology.

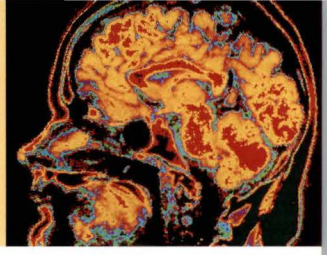
these chemicals is even more demanding than mapping brain function," he says. "Chemical resolution and sensitivity increases with high magnetic fields and we've been able to do unique things at 4 Tesla which have whetted our appetite. We think 7 Tesla will be a significant step up."

Measuring blood flow in the brain is another important function of MR. Blood flow is well-regulated in the brain – when an area has increased neural activity, it receives more blood flow. With high field MR, blood flow can be quantitated and measured. This also has many clinical applications in individual conditions, such as stroke.

Once developed, these methods can be applied to many biomedical problems. For example, faculty researchers Rolf Gruetter and Betsy Seaquist have been using MR to measure glucose transport across the brain in diabetic patients. In diabetes, glucose metabolism is altered and Seaquist has been studying the brain's ability to handle glucose (its main energy source). MR is also useful in research aimed at understanding mental disease since many mental disorders have associated abnormalities with brain metabolism and brain chemistry, related to neurotransmission. "Mental disease treatment will benefit significantly from the methodologies we're developing. As well as the goal of how the normal brain functions – a primary application," says Ugurbil.

The University was one of the first to introduce brain imaging and the CMRR pushed the high magnetic field aspect of functional imaging. At the time, using high magnetic fields for human studies was brand new and there was concern in the neuroscience community that it would not be possible. Yet the results were impressive. "There was a lot of scepticism," says Ugurbil. "And it has been very rewarding proving them wrong.

"Today, it is recognized that high fields are better for brain imaging. As a result, there are many institutions acquiring high magnetic field systems and trying to set up labs like ours. We are going to the next level and the scientific community is watching what is going to happen with the 7 Tesla. I think



that five or six years from now, we'll see many laboratories again trying to duplicate what we have done."

The field continues to grow at a surprising pace. "Magnetic resonance has turned out to be extremely flexible and versatile. Year after year, many capabilities have been introduced and it is actually quite amazing," says Ugurbil. "Magnetic resonance keeps evolving. Every year we can do new things. It seems that there is no end in sight."

By Jodi Ohlsen Read

INVESTIGATING NEURODEGENERATIVE DISEASES:

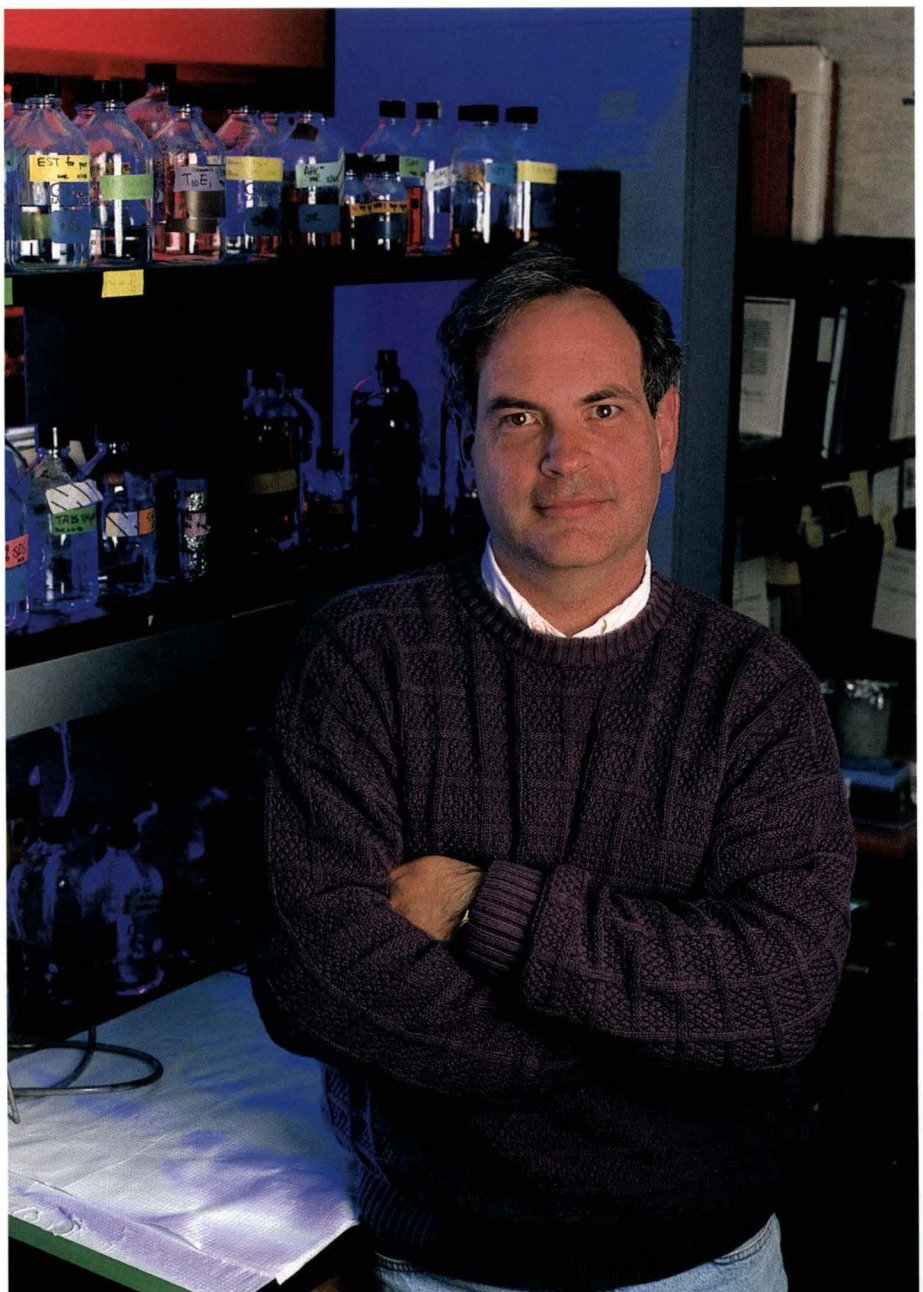
Harry Orr, Ph.D.

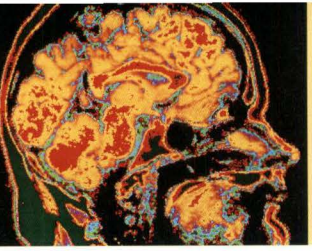
Sometimes solutions to big problems start out very, very small ... perhaps at the molecular level. Harry Orr, Ph.D., professor of laboratory medicine and pathology, focuses on molecular genetics to learn more about neurodegenerative diseases like ataxia, a name given to a group of diseases characterized by slurred speech, unsteady gait, poor hand control, and other uncoordinated movements.

"Our research is now targeted to molecular genetics of the cerebellum, the part of the brain which regulates coordination, gait, and so on. Specifically, my major approach is to study the genetics of ataxia – especially spinal cerebellar ataxia type 1 (SCA 1)," says Orr.

Orr and his colleagues have already cloned several genes, including the gene for SCA 1. This has allowed them to develop a model which provides an experimental system to study the disease. Recently, Orr has used a model to help answer questions about a mutant protein. "The protein has to get from the cytoplasm into the nucleus. If we know how the mutant protein affects the function of the nucleus and understand how the protein gets from the cytoplasm to the nucleus, we could develop a strategy for effective treatment," explains Orr. "We have been working on this disease for 12 years and for first time, we are beginning to ask specific

Harry Orr, Ph.D., is researching the molecular genetics of the cerebellum.





questions that might lead us to determine how we might develop treatments."

Orr's efforts have laid the groundwork for many advances. "It took us seven years to clone the gene. Once it was cloned it only took two years to develop a model. In the last couple of years, we have been able to ask some very specific questions about the disease process. The timeline is shrinking in regards to productivity – we're really reaping the harvest."

Information from these basic biological investigations could be useful in developing therapies for people with neurodegenerative diseases.

Information about ataxia is available through the Bob Allison Ataxia Research Center, founded in 1991. The Minnesota Medical Foundation affiliate strives to inform the public about ataxia and to raise money for basic research into the disease's causes and potential treatments. The center is named after the late Bob Allison, a former Minnesota Twins baseball star who was afflicted with ataxia. To contact the Bob Allison Ataxia Research Center, call 612-450-5380.

By Jodi Ohlsen Read
Photos by Wayne R. Martin

Check out actual images of the brain and learn more about the CMRR on the web at www.cmrr.drad.umn.edu. For more information about the Neuroscience Department, check the website at: www.neurosci.umn.edu

NEUROSCIENCES RECOVERY FUND

On April 5 vandals broke into neuroscience research laboratories at the University of Minnesota, causing damage of approximately $2 million. In addition to the physical damage, it is estimated that as much as two to three years of research progress was lost in the incident, including investigations on brain cancer, Alzheimer's disease, and Parkinson's disease.

"This loss is a setback not only to those who are currently afflicted with diseases of the brain but to those who will be in the future," says Tim Ebner, head of the Neuroscience Department.

While insurance will cover most of the damage done to the labs, the cost to reestablish the research to its previous point is not covered. Funding for this neuroscience research came through grants from the National Institutes of Health (NIH) and through private support.

"The NIH does not have an insurance or emergency fund for situations like this," says Ebner. "To get the funding back to where we were, we must apply for grants and go through the normal competitive process which is extremely time consuming. It will take a minimum of one year to get re-funded."

The Minnesota Medical Foundation has established the Neurosciences Recovery Fund to help recover the research in a shorter timeframe. The Foundation has seeded the fund with a special $25,000 grant and welcomes additional contributions from alumni and friends of the Medical School. The fund will be used to repeat certain experiments, assemble data, collect new tissue samples, support technician's salaries, and help graduate students complete studies which were disrupted by the damage.

Gifts can be directed to: Neurosciences Recovery Fund, Minnesota Medical Foundation, Box 193 Mayo, 420 Delaware St. SE, Minneapolis, MN 55455, or call 612-625-1440 for more information.

Molecular and Cellular Medicine:

HOLDING THE KEY TO UNPRECEDENTED NEW THERAPIES

For every human being, cellular and molecular medicine offers hope through the development of new technologies. Hope that new gene therapy techniques will block the growth of blood vessels in tumors. Hope that defects in the Alzheimer's gene can be corrected through an infusion of new, healthy cells. Hope that a new kidney can be created through stem cells. Hope that genetic engineering could, some day, eliminate muscular dystrophy, Parkinson's disease, diabetes, and cystic fibrosis.

New understanding at the cellular and molecular level will enable scientists to detect and correct disease-causing gene flaws and create better vaccines. Artificially produced proteins will help a child who lacks growth hormone grow taller, and provide insulin for people whose bodies are unable to produce it. Scientists will be able to manipulate the immune system to treat diseases such as cancer and AIDS, and prevent organ rejection after transplantation.

Drs. Leo Furcht and Jeff McCullough are just two of many University of Minnesota researchers working to unlock the door to a new era of medicine through an understanding of the human body at the most basic level.

Better Living Through Peptides

Most body processes rely on some form of cellular interaction, whether it's cells reacting to their environment or cell-to-cell communication. A cellular interaction between a sperm and an egg allows fertilization to occur, and many stages of embryologic development involve cell adhesion processes. Cellular interaction and adhesion processes play a major role in many diseases, and in strokes, heart attacks, arthritis, and various forms of cancer.

Leo Furcht, M.D., head of the Department of Laboratory Medicine and Pathology, has researched the factors that allow tumor cells to spread throughout the body for the last 20 years. "My colleagues and I want to know why tumors spread where they spread and what makes a tumor cell stay contained," he says. "Certain tumors have a propensity to spread to certain places, but all types are invasive. If we could uniformly cause a tumor to stay contained, we could cure it.

"We also want to understand the general principles to continue developing pharmaceuticals that would ultimately control that process," Furcht says.

Genetic information from certain proteins found in cells that control cell adhesion provides the basis for the bio-pharmaceuticals developed by Furcht's group. "With the genetic information we found, we used computer programs to design little fragments of molecules that we thought might have a biologic function," he says. Those peptides, or short chains of amino acids, were chemically synthesized into more complex structures called polypeptides. The new molecular chains were examined to see if they could mimic the function of the whole molecule by binding to receptors, which are areas on the cell that make adhesion to other surfaces possible, and control the malignant cell's behavior.

"The objective of the research was that we could potentially stop a tumor cell from spreading, or influence where it went," Furcht says. "We now have a series of compounds that seem to be able to influence whether tumor cells adhere, migrate, invade, and do the other very bad things that they do."

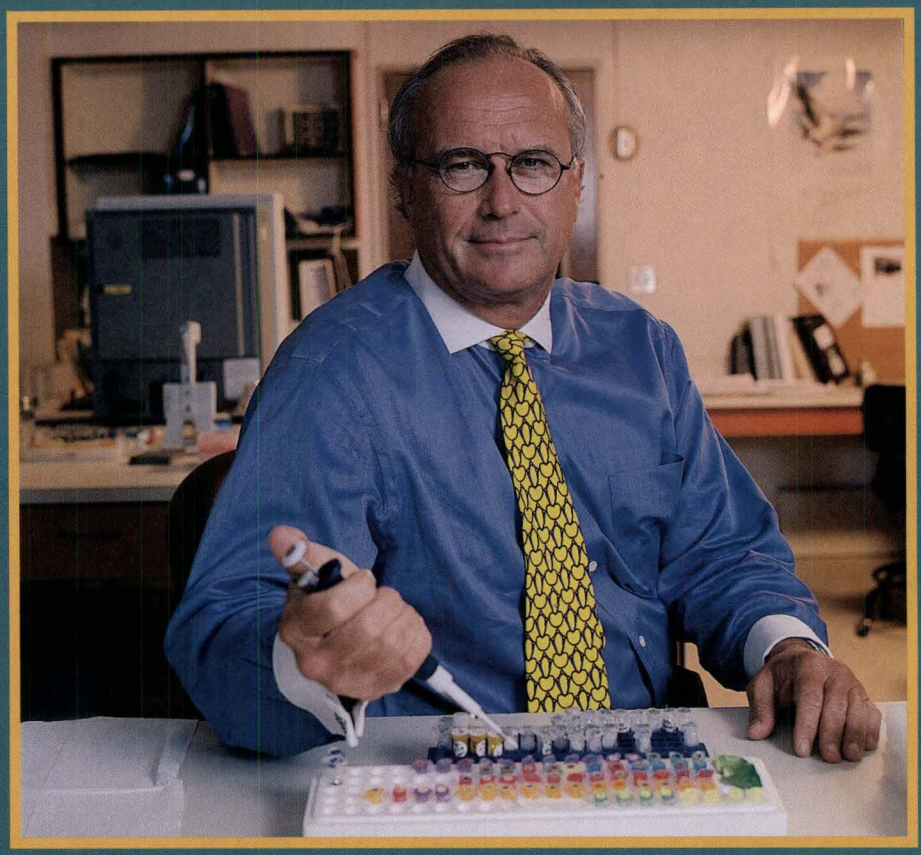
Two decades of promising basic research have led Furcht and his team in a surprising direction. "We said, if these bio-pharmaceuticals, or polypeptides, could influence tumor cells, could we use them in situations where you have inflam-

mation in the body or circumstances where you want to interfere with cell adhesion processes that occur as part of certain acute diseases?"

For instance, when a person has a heart attack or a stroke, the cells that line blood vessels, called endothelial cells, get activated. This state causes white blood cells and platelets to adhere to those cells, resulting in clogged arteries. "Basically, it's like a garden hose that you stuff up with pebbles so that the water can't flow through," Furcht explains.

A collaboration with Walter Low, Ph.D., in Neurosurgery and Jim McCarthy, Ph.D., in Laboratory Medicine and Pathology produced a research model that shows promise for heart attack and stroke patients. "We decrease blood flow to the brain for 30 minutes in a research model," Furcht says, "thereby simulating a stroke." This is very similar to what happens in many heart attacks.

Releasing arterial restriction allows the blood to flow into the brain, which activates the adhesion mechanism between endothelial cells in the brain and white blood cells. The trapped white blood cells constrict the artery and release toxic chemicals. "These cells normally fight infection, so if you're having an infection, that's a great thing," Furcht says. "But if you're having decreased blood flow to the brain, that's a bad thing." The end result is reperfusion injury, which causes substantial tissue damage.



Leo Furcht, M.D., is researching the factors that allow tumor cells to spread. He is holder of the W.W. Allen-Elsa U. Pardee Chair in Cancer Biology.

In the lab, Furcht's group observed that administering synthesized bio-pharmaceuticals two to four hours after a stroke could prevent brain damage up to 70 percent of the time compared to untreated models.

Furcht describes the breakthroughs in heart attack and stroke treatment as an "unexpected side benefit of the use of these peptides." Furcht's peptide research has led to a fruitful collaboration with the commercial biotechnology industry. Companies with an interest in developing the compounds into potential drugs bring millions of dollars of research support to the University by sponsoring research studies.

"[These companies] have paid for getting a lot of these compounds synthesized, and have also put them in the hands of other investigators around the country," Furcht says. Sharing results with other researchers not only increases the knowledge of participating doctors, but it also gives new hope to patients. "Other labs are taking the same type of peptide research and applying it to other areas. One group has shown that you can protect heart graft survival twofold by using a peptide, and another lab has had a very positive effect on promoting healing in burn patients," he says.

Peptides derived from cell adhesion molecules could potentially play a huge role in curing many diseases and conditions in the near future. The next step is to expand research into areas beyond heart attacks and strokes. "This could work for everything where you have cellular interactions, like allergies and asthma, or following angioplasty," Furcht says. "Now that we have proven research models, there's indication that beginning some clinical trials would be warranted in some areas." If a peptide therapy were proven effective, it could reach patients in as little as five years.

By Andrea Bie

Bringing novel therapies closer

Developing an innovative treatment for a disease is one thing. Implementing that treatment is an entirely different venture. To help identify promising biotherapies and provide the needed backup, the University has created the Molecular and Cellular Therapeutics Center.

Jeffrey McCullough, M.D., professor in the Department of Laboratory Medicine and Pathology, will be leading this effort

as director of the new center. "My primary responsibility as director is to use the center to help facilitate the work of a wide variety of people throughout the Academic Health Center," says McCullough. "The mission is to help speed the application of novel therapies. The focus will be on getting these new therapeutic agents into production in a way that makes it suitable for human use and helping investigators begin their initial clinical trials.

"When someone in a research lab finds a way to isolate cells, or expand cells, or some way to get cellular material to do new things, we now have a facility to take that research idea and scale it up and produce it in a manner that meets all FDA requirements. Then we can get it to people for clinical trials," explains McCullough.

The facility, located on the St. Paul campus, is a valued asset. "We're extremely fortunate to have this facility at the University of Minnesota," says McCullough. "It is a unique building – not a research lab, but a building designed to manufacture biological agents. It should enable the University, more quickly than other universities, to implement some of these novel therapies because we have a way to make them."

The Molecular and Cellular Therapeutics Center will serve investigators from many research areas, including bone marrow stem processing, brain cancer, orthopaedics, diabetes, and ophthalmology.

The center will also provide some basic services, such as ways to store cells. "This lab will be able to support different methods for various cells. An umbilical cord blood bank will also be part of the center," McCullough says.

Graduate students throughout the health sciences can learn more about translational research as it is demonstrated through the center. "We are very pleased to have a grant from the Graduate School to support our work with graduate programs. If there are students interested in translational research opportunities, we want to foster that," says McCullough.

"The grant also allows us to initiate an annual symposium with the biotechnology industry in Minnesota so we can promote interaction between University investigators and biotechnology companies in Minnesota."

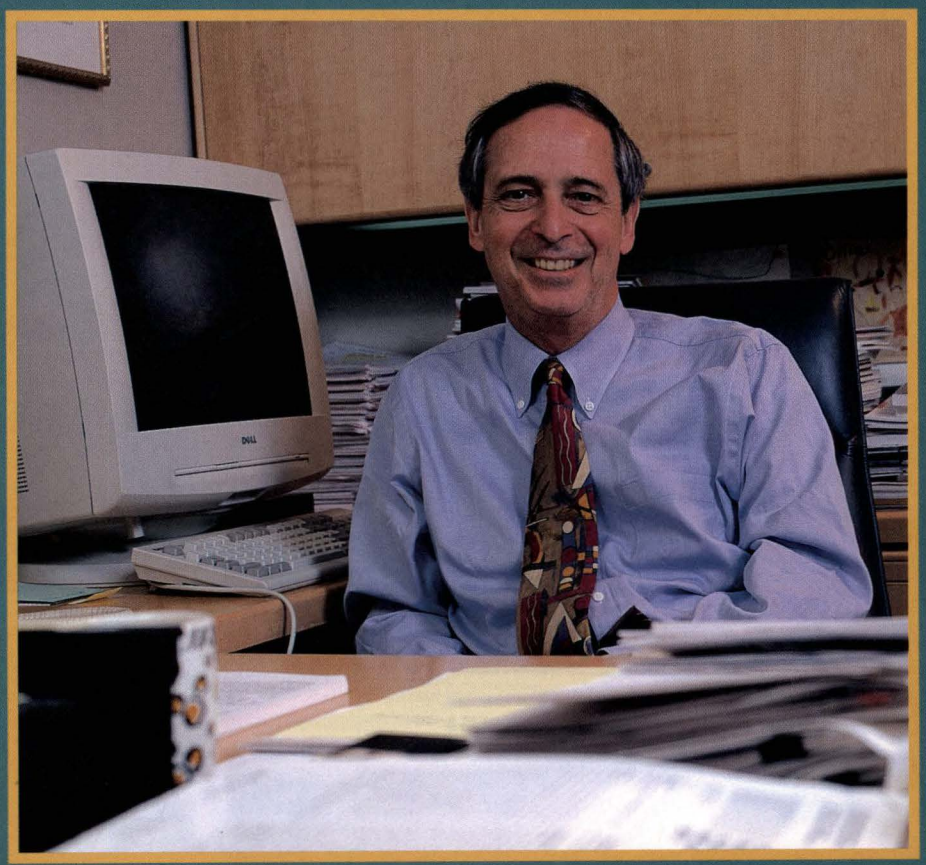
McCullough also has his own areas of specialized research. As a national leader in blood banking and transfusion medicine, he focuses on blood cell therapy and preservation and isolation techniques of stem cells.

"We've been involved in studies giving a growth factor G-CSF (granulocyte colony stimulating factor) to mobilize bone marrow stem cells into the peripheral blood. You can then collect those stem cells from the blood and use them for transplants," says McCullough. "We've probably done more of this than anyone else in the U.S., maybe in the world – it has been a big program."

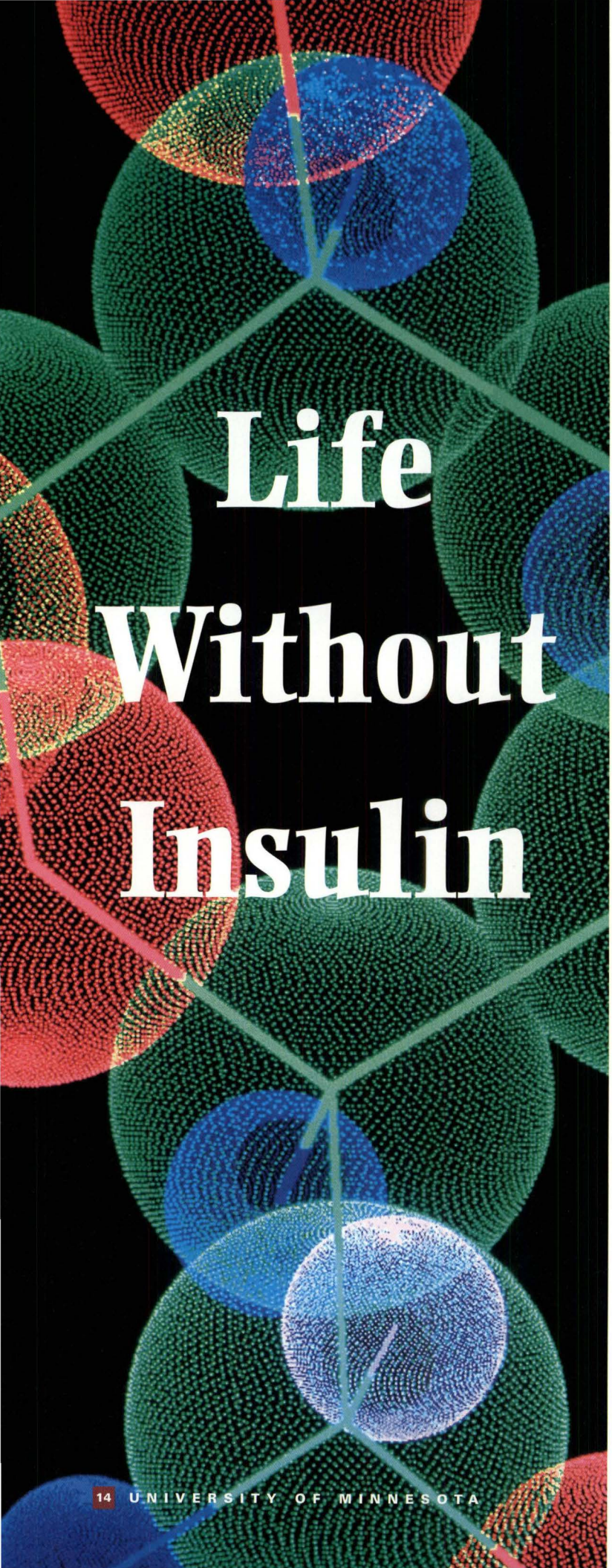
He is also working on a substance that could increase the amount of platelets blood donors can give. "Thrombopoietin is a hormone-like substance that controls platelet production," explains McCullough. "In studies, we have collected huge numbers of platelets from an individual donor. Now we are looking at the effects of transfusing those large doses – whether it will reduce the number of transfusions patients need. We also have to look at many other aspects, such as how to collect the platelets and how to store them."

McCullough prefers to highlight the efforts and goals of the center and his colleagues. "While my own research is exciting, our main goal in this center is the promotion and facilitation of a wide variety of novel biological therapies."

By Jodi Ohlsen Read
Photos by Wayne R. Martin



Jeffrey McCullough, M.D., is head of the new Molecular and Cellular Therapeutics Center and holder of the Variety Children's Association Chair in Molecular and Cellular Therapy.



Life Without Insulin

The Diabetes Institute for Immunology and Transplantation at the University of Minnesota is associated with one of the largest and most successful pancreas transplant programs in the world, and recently celebrated the 1,000th such transplant. With pancreas transplantation established as a routine therapy to achieve insulin independence in diabetes, the Institute is focusing its research on islet transplantation, a technique also pioneered at the University. Islets have the potential to achieve the same success as transplantation of the pancreas, but with less surgery. Islet transplantation also creates an opportunity to test new anti-rejection protocols that may have fewer side effects than those currently employed for solid organs.

This year, almost 800,000 people in the United States will be diagnosed with diabetes, including 30,000 with insulin-dependent Type 1 diabetes mellitus. The disease will cause or contribute to the deaths of more than 185,000 people. Worldwide, an estimated 100 to 200 million people have diabetes. Diabetics lead lives consumed with finding balance – coordinating insulin injections with the amount and type of food eaten, adjusting levels of exercise, sleep, and even stress – all to prevent diabetic emergencies.

Varying blood sugar levels can result in short-term side effects such as loss of consciousness or seizures. Over time, damage to the nervous and circulatory systems can occur, leading to conditions such as blindness, kidney failure, heart attacks, strokes, and gangrene.

"The burden of diabetic management is enormous for individual patients," says David E.R. Sutherland, M.D., Ph.D., director of the Diabetes Institute for Immunology and Transplantation and head of the Division of Transplantation. "You prick your finger four times a day to measure your blood sugar – that's 1,500 times a year.

"If you think you've got a lifetime of sticking your finger 60,000 times, you can see where the pancreas transplant or the islet transplant might be very attractive," he continues. "With the pancreas transplant you avoid the complications of diabetes – you don't have to do your finger sticks, and you deal with the side effects of immunosuppression. For many patients, that's more attractive than having to deal with the diabetes management."

Trained under skilled surgeons such as Richard Lillehei and John Najarian, Sutherland is regarded as the pioneer of pancreas transplants. Last year, Sutherland and his team at the Institute performed 114 pancreas transplants, about 10 percent of the nation's total. "We've done 55 so far in the first four months of this year, and we expect to do well over 150," Sutherland says. "The next largest program will probably do half that number." More than 1,000 pancreas transplants have been performed at the University of Minnesota, nearly 10 percent of the world's total.

"The University has a wonderful reputation," says Todd Benson, the 1,000th pancreas transplant recipient. "It's not just the surgeons; it's the whole group of people. And the after-care is great – I can call just about any time of the day or night if I need to talk to anybody."

The Institute's goal is to treat as many diabetics as possible. But, pancreas transplants are somewhat limited. "There are 5,000 cadaver donors a year in the United States that are suitable for organ procurement, so that's the maximum number you can do," Sutherland explains.

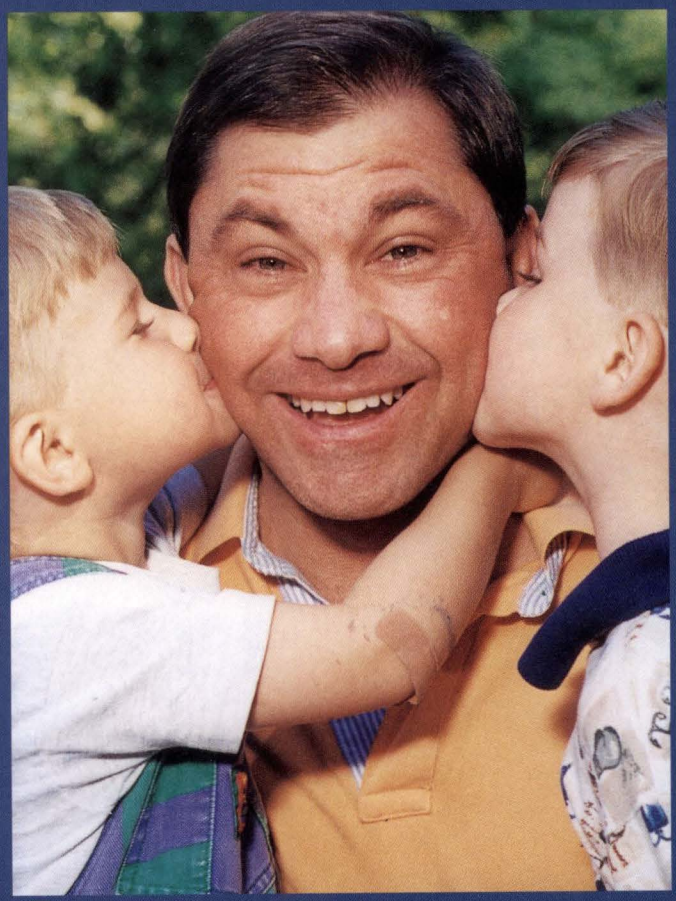
With 30,000 new cases of Type 1 diabetes each year, pancreas transplants simply can't keep up with the demand. "I envision, with us leading the way, that within the next two to three years there will be five to 10 thousand pancreas transplants done each year in the United States," Sutherland says. "We'll probably start

"Diabetes was a disturbance in my otherwise normal teenage life. My entire life depended on eating, watching my diet, and having sugar. It was a hassle, and it was this big secret that I kept because I didn't want to be treated differently.

"The diabetes caught up to me in my late 20s when I had some retinopathy and my kidneys started to fail. My sister volunteered to donate a kidney when the time came that I'd need it. As an extra precaution, I went on the University's recipient list.

"A kidney and pancreas became available and I had five minutes to make up my mind. My new pancreas started producing insulin immediately and I haven't been on insulin since. Before my surgery, my wife and I decided not to have children because of my health. We now have Michael, 4, and Andy, 3."

–Bill Wilson, Minneapolis, was diagnosed with diabetes at age 12 and received a kidney and pancreas at the University of Minnesota in 1990.



ABOVE: *David E.R. Sutherland, M.D., Ph.D., is director of the University's Diabetes Institute for Immunology and Transplantation. He consults with patient Barbara Earing.* BELOW: *Bernhard Hering, M.D., is head of the Islet Research and Transplantation Program.*

splitting the pancreas to try and get maximum use out of it. We know from using living donors that half a pancreas is adequate. But if we're going to treat 30,000 patients a year, we're going to have to figure out either how to get more donors, which may be difficult, or use xenografts [animal to human transplants]."

The future for islets

While pancreas transplants are highly successful – a graft from a human cadaver can consistently establish insulin-independence and perfect control of blood sugar – they require major surgery and immunosuppressive treatment. Because of these side effects, the Institute is focusing its research on islet transplantation. This technique was pioneered at the University and shows great promise as an alternative to pancreas transplants.

The University of Minnesota is one of eight research centers worldwide that will share more than $10 million in grants to study islet cell transplants as a treatment for diabetes. The grants, given by the Juvenile Diabetes Foundation International, are intended to support research toward a cure for juvenile, or Type 1, diabetes. The University was selected as one of eight world-class research programs in diabetes.

Bernhard Hering, M.D., an internationally known leader in islet transplantation, established an active clinical islet transplant program at Giessen University in Germany before joining the Institute in 1996 as head of the Islet Research and Transplantation Program in the University of Minnesota Departments of Surgery and Medicine. Hering is also cofounder and coordinator of the International Transplant Registry and director of its North American branch.

"He's an endocrinologist, trained in Germany, whose whole career is devoted to understanding how we can get islets to work better," Sutherland says. "I keep the pancreas transplant program going, he keeps the islet transplantation program going, and intellectually we interact together toward our mutual goal."

"There has always been a lot of very promising research in islet transplantation," Hering says. "But translation from research findings into practical benefits for people has been a challenge. Now there are realistic opportunities to let more people benefit earlier in the course of diabetes from transplantation without the need for continued immunosuppressive treatment."

When the islet cells in the pancreas stop producing insulin to regulate blood sugar levels, Type 1 diabetes develops. People with the disease must then take insulin injections daily or replace the islet cells with either a pancreas or islet cell transplant.

The islet cell transplant is a relatively simple procedure – for the recipient. Islets are isolated from a pancreas and injected into the portal vein of the recipient's liver. The entire operation, which requires only a local anesthetic, is monitored with a CT scan. Injecting the islets through a catheter into the liver takes 15 minutes. The cells then travel through the blood stream into liver capillaries, where they lodge and begin producing insulin according to blood sugar levels.

Ultimately, this procedure promises significant advantages over pancreas transplantation. Islet transplants are minimally invasive. Strategies to eliminate the need for ongoing immunosuppressive drug treatment can be tested in islet recipients without much risk. The goal is to keep the recipient from recognizing islet tissue from any given donor as foreign, while retaining the ability to see and destroy cancer cells and infectious agents. "In islet transplants, there are unique opportunities for tolerance induction," Hering says. "Islets can be kept in culture, perhaps grown in culture, while the recipient is pre-treated with tissue from prospective donors in conjunction with immunomodulation in an attempt to induce tolerance."

Availability is another theoretical advantage of islet transplants. "With pancreas transplants, we will never be able to keep up with the demand," Hering says. "But in islet transplantation, maybe we can use animal islets, or engineered cell lines. Or we can expand the islets in culture. There are different options to overcome the limitations that we face in other organ transplantations."

Islet isolation is labor intensive, and thus expensive. However, islet transplantations can also be done on an outpatient basis and may ultimately cost less than pancreas transplants.

Progress in islet cell transplantation has generated much optimism. Previously, only about 10 percent of islet transplant recipients achieved an insulin-free period after the procedure, but a recent clinical trial in Germany that Hering participated in showed 30 percent of patients being insulin free after one year. An additional 40 percent of recipients had partially functioning transplants, which resulted in improved blood sugar control and a loss of insulin reactions.

"The very first patient I transplanted in 1992 became insulin independent," Hering says. "Once you've seen this, once you've seen what's possible, you are driven to keep working. The history, infrastructure, and commitment here at the Diabetes Institute are why I believe we will be as successful with islets as we have been with the pancreas."

The Institute aims to raise the success rate of islet transplants to the level of pancreas transplants by improving methods of islet preparation and using new anti-rejection strategies. Expanding the number of pancreas transplants is more difficult. In 1997, only about .1 percent of the Type 1 diabetic population received pancreas transplants because of the shortage of human cadaver donors. "We don't reach the majority of the people," Hering says. "We want to help more people, and that is why the goal of the Institute is to develop islet xenotransplantation."

"No more insulin injections, insulin reactions, no need for self-monitoring, no dietary restrictions. We have that now with pancreas transplants. The day anti-rejection drugs are no longer required – that's the day we'll call diabetes cured," says Sutherland. "That day will come."

For more information on the Diabetes Institute, visit the website at: www.DiabetesInstitute.org or call Dawn Halverson at 612-624-0450.

By Andrea Bie
Photos by Wayne R. Martin

DIABETES BY THE NUMBERS

- Every year, diabetes costs the United States over $98 billion in medical expenses and lost productivity.
- Type 1 diabetes is more prevalent in Caucasians, but African Americans, Hispanic Americans, and Native Americans are 2 to 2.5 times more likely to get Type 2 diabetes. (In Type 1 diabetes, the immune system attacks and destroys the insulin-producing beta cells. Glucose builds up in the blood stream, and cells can no longer take in enough energy to stay alive. In Type 2 diabetes, the body's tissues are partially resistant to the action of insulin, and the pancreas can't compensate for the increased insulin need, so glucose levels elevate. This type is managed through diet, weight loss, and oral medications.) Pancreas transplants have also been successful in Type 2 diabetics.
- The life expectancy for diabetics averages 20 years less than that of non-diabetics. Middle-aged people with the disease have a death rate twice as high as their non-diabetic peers.
- Cardiovascular disease is two to four times more common in diabetics, and is present in 75 percent of diabetes-related deaths.
- Strokes are two to four times more common in people with diabetes.
- Kidney failure occurs in 25 percent of Type 1 diabetics on dialysis.
- Diabetes is the leading cause of adult blindness in the United States. Some retinal damage is evident in 90 percent of all persons who have had diabetes for 15 or more years.
- More than 50,000 diabetes-related amputations are performed each year.

Adolescent alcoholism and anxiety

Alcohol and other substance abuse is a major problem threatening young people today. And, many adolescents being treated for alcohol abuse also have an anxiety disorder – nearly 30 to 40 percent. Learning more about this connection could help improve their chances.

Can an anxiety disorder bring on alcoholism in an adolescent? Some theories suggest that the anxiety disorder may promote alcoholism. Perhaps the alcohol is used as a self-medication to relieve the anxiety symptoms. Or, alcohol dependence may cause anxiety disorders through withdrawal or by biological effects on the brain through chronic use. Or, it could be a combination.

To help answer these questions, Carrie Borchardt, M.D., is researching the issue with the help of a $9,950 Minnesota Medical Foundation grant. The study will examine whether anxiety disorders in teen alcohol abusers make the adolescents more likely to relapse in their drinking, and whether specific treatment for anxiety disorders helps prevent relapses.

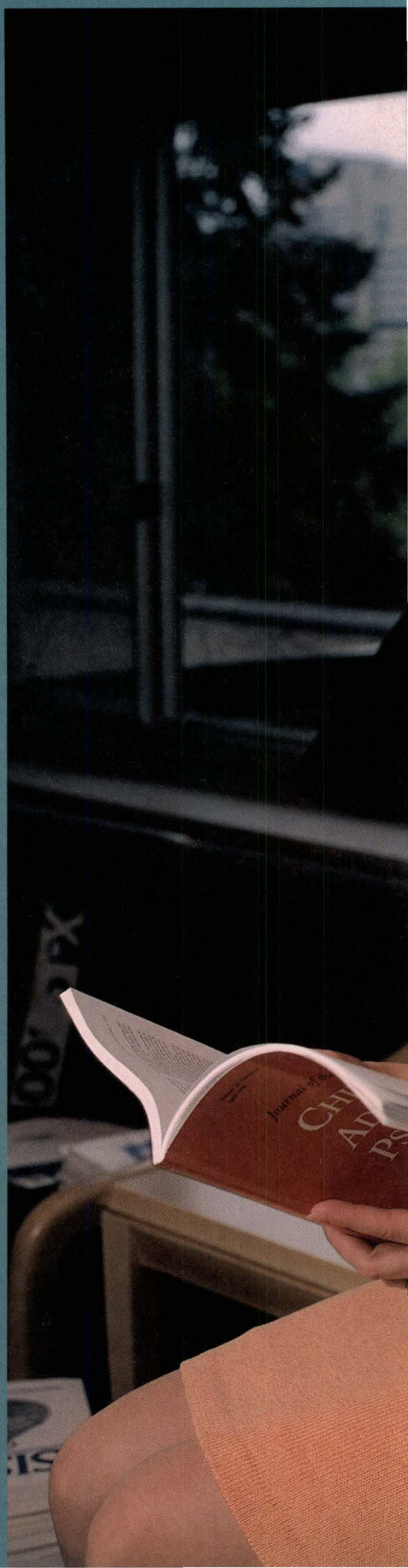
Currently, there is very little literature about this issue. "Other things, like depression and attention deficit, tend to be identified but anxiety disorder is more frequently missed. Other studies haven't always looked for anxiety disorders," she says. "Now, in child psychology, our knowledge about this disorder has really increased and tools for measuring it have increased."

Adolescents (ages 13-18) will be recruited from substance abuse programs at the Fairview-University Medical Center, Riverside campus. "One goal is to determine the rates of anxiety disorder and if teens show up with anxiety symptoms, is it a separate disorder or will it go away through treating the substance abuse," says Borchardt.

"We are also interested in the role anxiety plays in relapse. In adults who relapse into chemical abuse, those who have anxiety blame it as a reason for drinking – a self-medication approach. There is some evidence to suggest this for adolescents also. One thought is that kids drink or use marijuana to decrease the anxiety symptoms. For example, they may drink before a social event. One concern is that if they have both anxiety and substance abuse, they may relapse if substance abuse is treated but anxiety remains," Borchardt explains.

Once the link between anxiety disorder and alcoholism in teens is established, the next step is to develop effective treatment. The data from this project will support an application for a further National Institutes of Health grant to study treatment of anxiety disorder in adolescents with alcohol abuse or dependence.

Carrie Borchardt, M.D., received a Minnesota Medical Foundation grant to study alcoholism and anxiety in teenagers.



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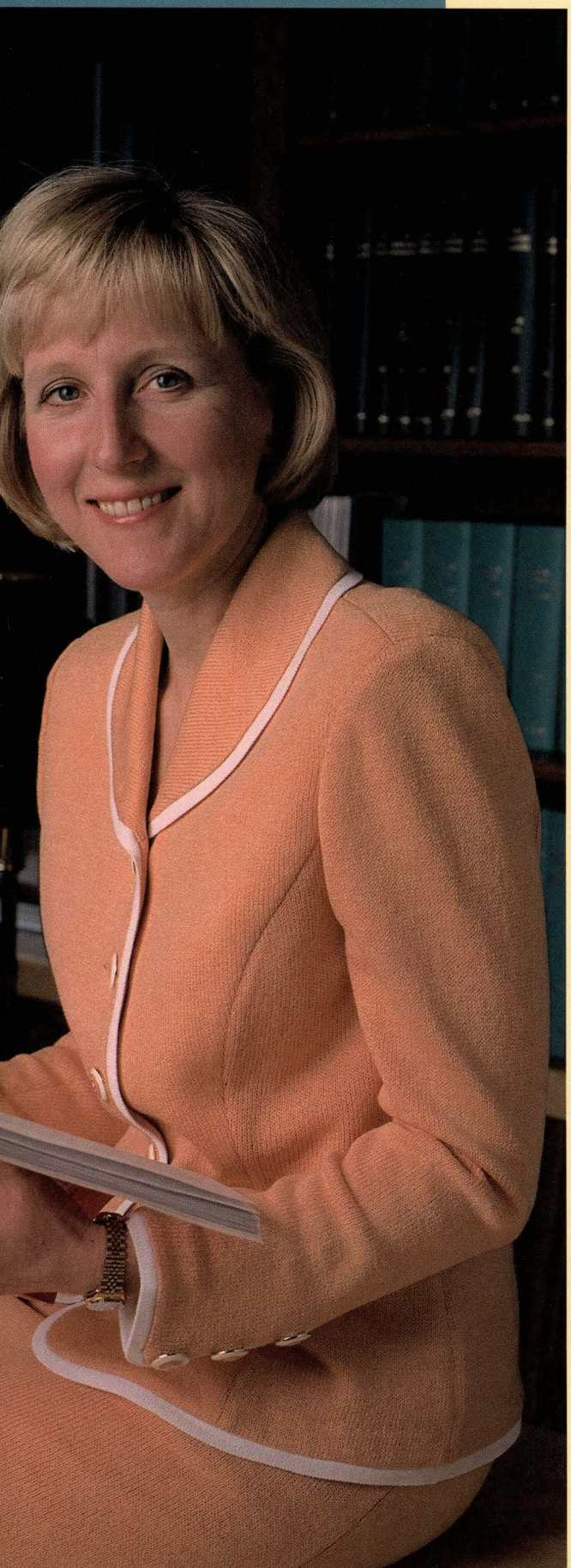


Foundation approves faculty grants

The Minnesota Medical Foundation Research and Special Grants Committees recently approved awards totaling $379,073 — $211,868 for research projects and $167,205 for equipment purchases.

FACULTY RESEARCH GRANTS include: ***Carrie M. Borchardt, M.D.,*** Psychiatry, Relationship between anxiety disorders and alcoholism in adolescence, ***Gregory J. Connell, Ph.D.,*** Pharmacology, Development of a novel chemotherapeutic strategy, ***Augustin P. Dalmasso, Ph.D.,*** Laboratory Medicine and Pathology, Protection of xenogenic endothelium in a porcine kidney, ***Patricia Ferrieri, M.D.,*** Laboratory Medicine and Pathology, Pediatrics, Identification and characterization of the gene encoding the R4 protein from group B streptococcus, ***Seong-Gi Kim, Ph.D.,*** Radiology, Mapping orientation columns in the visual cortex using MRI, ***Lakshmanan Krishnamurti, M.D.,*** Pediatrics, Molecular epidemiology of an aspect of sickle cell anemia, ***Robert F. LaPrade, M.D.,*** Orthopaedic Surgery, Development of an in vivo model of posterolateral knee instability, ***Paul Letourneau, Ph.D.,*** Cell Biology and Neuroanatomy, Molecular mechanisms of axonal growth and pathfinding, ***Laura J. Mauro, Ph.D.,*** Biochemistry, Molecular Biology, and Biophysics, Genetics research on PTP enzymes that regulate cell differentiation, ***Frank Q. Nuttall, M.D., Ph.D.,*** Medicine, Amino acid stimulation of insulin and glucagen secretion, ***Yun Qiu, Ph.D.,*** Laboratory Medicine and Pathology, Research on therapeutic targets for ekt in tumor invasion and metastasis, ***George M. Realmuto, M.D.,*** Psychiatry, Peer affiliation of disruptive and normative children in the Early Risers Prevention Project, ***Mark Rosenberg, M.D.,*** Medicine, The protein clusterin as a marker of renal disease, ***Timothy Schacker, M.D.,*** Medicine, Contribution of sexually transmitted diseases to male infertility, ***Amy P.N. Skubitz, Ph.D.,*** Laboratory Medicine and Pathology, Evaluation of ovarian carcinoma cells for cell adhesion receptors, ***Scott R. Sponheim, Ph.D.,*** Psychiatry, Cognition-related brain abnormalities in relatives of schizophrenic patients, ***David D. Thomas, Ph.D.,*** Biochemistry, Molecular Biology, and Biophysics, Research on calcium transport regulation in the heart, and ***Jo-Anne van Burik, M.D.,*** Medicine, Research study of diagnostic tests for fungal infections.

FACULTY EQUIPMENT GRANTS include: ***Sandra D. Armstrong, Ph.D.,*** Microbiology, French press for research on a whooping cough bacterium, ***Susan A. Berry, M.D.,*** Pediatrics, Scintillation counter for pediatric growth and metabolism research, ***Bruce R. Blazer, M.D.,*** Pediatrics, Gene gun delivery system for research on immune responses to cancer, ***Sean O. Casey, M.D.,*** Radiology, MRI spectroscopy for neurology research, ***Electra Coucouvanis, Ph.D.,*** Cell Biology and Neuroanatomy, Molecular control of cavitation in the mouse embryo, ***William C. Engeland, Ph.D.,*** Surgery, Equipment to study tissue regeneration, ***Philip McGlave, M.D.,*** Medicine, Analysis of angiogenic net balance in patients with non-small-cell lung cancer, ***Ronald C. McGlennen, M.D.,*** Laboratory Medicine and Pathology, Microdispensing instrument to aid in silicon based biosensor development, ***Louise M. Nutter, Ph.D.,*** Pharmacology, Fluorescent/phase contrast microscope for cancer, genetics, and neuroscience research, ***William Shawlot, Ph.D.,*** Genetics, Cell Biology, and Development, Inverted microscope for research on developmental genetics, and ***Catherine Verfaillie, M.D.,*** Medicine, PCR machine for cancer research on the genetic alteration of stem cells.

Becoming a medical student

What does it take to become a University of Minnesota Medical School student?

Excellent grades, of course. But, what else is important? Does an applicant with a strong science background have an edge over an English major? Not necessarily.

"The Admission Committee wants to know who an individual is," says Madgetta Dungy, Ph.D., director of admissions. "Academically, they have to be able to complete the rigors of medical education. But we also want to see a demonstrated background of concern and service to others. What influences them and motivates them to a career in the practice of medicine? We look for people who are academically superior with a broad educational background, who have taken the opportunity to do volunteer services."

Convinced that they meet these criteria and with their hearts set on becoming doctors, potential medical students begin the long road of application. Dungy suggests that prospective applicants allow at least a year for the complete process, using careful planning and a well-thought-out strategy.

Hopefully, the applicant has an impressive grade point average – as close to a 3.5 as possible to be competitive, says Dungy, but certainly above a 3.0. The committee looks at the grade average in science, nonscience, and overall coursework.

"Although the basic requirements for medical school have changed very little in recent years, biochemistry was added as a requirement about two years ago," says Dungy. "This is one of the more challenging courses and it is the direction the medical field is headed. I also see upper-level statistics becoming a requirement some time in the future because it is more and more necessary."

Before applying, the med-students-to-be must take the MCAT (Medical College Admissions Test). Candidates must then pick up their American Medical College Application Service (AMCAS) packet which contains the paperwork for applying, in one effort, to any of 125 participating medical schools. Applications submitted to AMCAS, which contain academic records, a personal statement, biographical information, and transcripts, must be in between August 1 and November 15.

Nationally, there has been a decrease in applications of about 6 percent. "The University has seen that as well," says Dungy. "Anecdotally, it has been suggested that people are looking at the length of training without guaranteed positions or financial security."

Once the Medical School Admissions Office receives copies of the applications, the Preliminary Screening process begins. This process determines residency, minimum GPA/MCAT scores, and minimum academic requirements. In 1999, the University Medical School received 1,874 applications.

If the applicant passes this screening, he or she must send supplemental information – an additional personal statement, five Letters of Evaluation forms, and a $50 application fee. Those considered competitive will be invited for interviews during December and March.

What makes a candidate competitive? Strength in academics and commu-

Madgetta Dungy, Ph.D., is director of admissions for the Twin Cities Medical School.

nication skills, strong faculty recommendations, volunteer experiences, participation in student organizations and/or research, intellectual curiosity, and demonstrating many positive personal attributes such as compassion, leadership, sensitivity, motivation for a career in medicine, and the ability to deal with stress.

Some time between April and August, acceptance letters are sent out. This year, 165 students will be accepted into the University of Minnesota Medical School. That is a drop in class size that has continued for the last five years and reflects the University's efforts to maintain smaller class sizes.

The composition of those classes has also shifted over time, with more women applying each year. The University is also striving to recruit more minority students. "With such diverse populations in the Twin Cities and Minnesota, we hope we can generate more interest and contact," says Dungy. Two years ago, Mary Tate joined the Medical School as director of minority affairs and diversity to help step up recruitment efforts. "Often, the attraction of a medical school for persons of color is an identified person that they can come to with questions," says Dungy. "We must attract and retain those students." As part of its overall mission, the Medical School Admissions Office continues to work to enhance the student body's diversity.

"My responsibility is to make the admissions process as equitable as possible," says Dungy. "The applicants should feel that it is fair and that they were evaluated as individuals."

Match Day means excitement, relief

On March 18, fourth-year medical students could breathe a sigh of relief as they learned their residency assignments on Match Day. Two hundred and twenty-nine students from the Twin Cities and Duluth Medical Schools – along with hundreds of medical students nationwide – were matched with residency sites through the National Resident Matching Program.

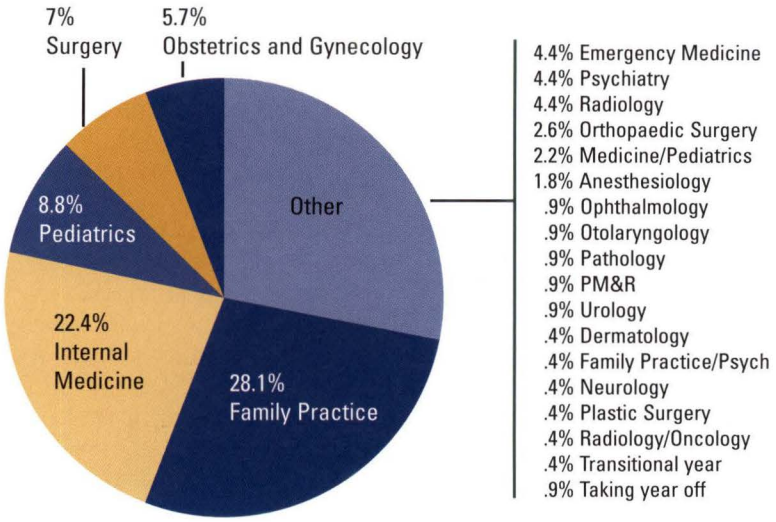
For the first time since the program's inception in 1952, the World Wide Web was utilized in the matching process, allowing students to look up their residency assignments online. "Match Day is one of the monumental events in a medical student's career," says Al Michael, dean of the Twin Cities Medical School. "It's an emotionally charged day, because quite often the residency location will be where the physician settles and practices for several years."

Over half of the students seeking residency programs remained in Minnesota, with 57.4 percent being placed in the 12 teaching sites throughout the Twin Cities. Primary care residencies were chosen by 61.5 percent, a 3.3 percent increase from 1998.

For more information about the National Resident Matching Program, log on to www.aamc.org/nrmp.

Medical School residencies

Where med students chose to spend their residencies (1999):



Head of Pediatrics Department named

James H. Moller, M.D., professor of pediatrics, has been named head of the University of Minnesota's Department of Pediatrics. He has been interim head since 1997.

"Dr. Moller is an outstanding pediatrician and educator," says Al Michael, dean of the Medical School. "He is internationally recognized for his contributions to the field of cardiology."

Moller has written or edited 12 scientific books and trained about 75 pediatric cardiology fellows. His current research interests include outcomes of cardiac surgery in children and long-term follow-up of congenital heart disease.

A native of Fresno, California, Moller received a medical degree from Stanford University and completed a residency in pediatrics and a fellowship in cardiology at the University of Minnesota. He joined the University faculty in 1966 as an associate professor.

James H. Moller, M.D.

Medical School receives $5 million gift for medical research

A life of frugality and a generous spirit have resulted in the largest gift ever to the University of Minnesota Medical School – a $5 million donation from the estate of a University alumnus who spent most of his career as a federal employee.

The gift is directed for unrestricted support of medical research. A portion of it will be used to establish an endowed chair in genetics and the neurosciences, providing valuable support to a world-class researcher.

Edmund Tulloch

Edmund Tulloch was born in Iowa in 1910 and moved to the Twin Cities as a young boy. He attended Bryant Junior High School and Central High School in Minneapolis, then enrolled in the University of Minnesota's business school, graduating in 1932.

Lifelong friend Gordon Stuart of Edina, Minnesota, remembers the high school and college days, when Tulloch was already cultivating habits of austerity. "He rode back and forth to the 'U' with me but I can't recall him ever offering to buy some gas," laughs Stuart. "He would never leave a tip at restaurants, and usually drank hot water instead of coffee or tea. When Viki (Stuart's wife) and I visited him in California in the '80s to help sort things out, he had lots of outdated coupons, but he wouldn't let us throw them out."

After college Tulloch worked briefly as a traveling salesman, then joined the armed forces and later served as a civilian in the Office of Civilian Personnel Headquarters in Tokyo. He met his wife Anna while in Japan, and they married in 1953. Edmund and Anna moved to the San Francisco Bay Area in 1959, where she was a homemaker and he worked for the U.S. Bureau of Alcohol, Tobacco and Firearms until his retirement in 1976. They lived in a small house and spent very little money on themselves. Anna died in 1981, and Edmund in February of 1998.

Before he died, Tulloch made a formal bequest to the Medical School on behalf of himself and Anna. According to Tulloch's nephew, the gift may have been motivated by a debilitating stroke Tulloch suffered late in life, coupled with a fondness for the University of Minnesota.

"The generous gift from the Tullochs gives us the flexibility to take advantage of countless opportunities to launch new research initiatives, invest in new technology, and support the work of our faculty researchers," says Medical School Dean Al Michael. "We will be strategic in the way we use the Tullochs' gift to more than fulfill their intention of helping future generations."

Welcome new Presidents Club members

Because of their generous support, the following people have become members of the University of Minnesota Presidents Club between January 1 and March 31, 1999. Their gifts have been designated (all or partially) to the Medical Schools, School of Public Health, Cancer Center, or other areas served by the Minnesota Medical Foundation.

BUILDERS SOCIETY
Myrtle W. Swanson
Edmund W. Tulloch

REGENTS SOCIETY
Frederick J. Bollum, Ph.D.

TRUSTEES SOCIETY
Dr. Maynard E. and Elaine E. Jacobson
John L. Kernik
Dr. Charles N. and Elaine Sadoff

CHANCELLORS SOCIETY
Drs. Malcolm N. and Marsha Blumenthal

FOUNDERS SOCIETY
Sally A. and A. William Anderson

HERITAGE SOCIETY
Dr. Franz Halberg
Lowell A. and Carol A. Weber

GENEROUS BENEFACTORS SHOW COMMITMENT TO THE FUTURE

Many thanks to the following people who have made significant commitments of $50,000 or more to the future progress of health-related education, research, and service at the University of Minnesota. Gifts were received between January 1 and March 31, 1999.

A gift from ***Earl E. and Doris J. Bakken,*** Waikoba, Hawaii, was given for the Division of Cardiology Bakken gift fund.

Dr. Frederick J. Bollum, Potomac, Maryland, has designated a gift for the Frederick Bollum Deferred Charitable Gift Annuity for the Frederick Bollum Endowed Biochemistry Research Fund. Dr. Bollum received his Ph.D. in physiological chemistry, Department of Biochemistry, in 1956.

A gift from ***Dr. Maynard E. and Elaine E. Jacobson,*** Sunfish Lake, Minnesota, will support the Maynard and Elaine Jacobson Scholarship for International Medical Studies. The scholarship helps provide awards for studies conducted in international medical student exchange programs, with an emphasis on programs to and from the Scandinavian countries. Dr. Jacobson, Class of 1955, is a professor of medicine at the University of Minnesota.

A gift from the late ***John L. Kernik*** has been given to the Diabetes Institute for Immunology and Transplantation for non-dietetic diabetes research.

Donor Recognition Wall unveiled

On any given day, as many as 14,000 patients, students, faculty members, and business people traverse the second floor corridor connecting the various buildings of the Academic Health Center. On March 1, a significant new addition was made to remind all visitors of the wide breadth of generosity provided to the Medical Schools through the Minnesota Medical Foundation.

A donor recognition wall, featuring benefactors who have supported health-related research and education, was installed at the busy intersection connecting the Phillips-Wangensteen Building, Diehl Hall, and the Fairview University Medical Center. The display permanently honors those who have contributed $100,000 or more in their lifetimes, along with individuals who contributed $2,500 or more during the previous fiscal year.

"For students and faculty who see the display every day, the wall serves as a confidence booster – a reminder that many people believe in their work to the point of making significant financial gifts," says Brad Choate, president and CEO of the Foundation. "We also feel it is very important to recognize benefactors for their past and current generosity."

To receive a brochure on the new donor recognition program, contact the Minnesota Medical Foundation at 1-800-922-1663.

Nationally known researcher named to Tickle Chair

Douglas Yee, M.D. – a medical oncologist nationally known for his research in growth factors related to breast cancer cell proliferation – has been named holder of the Tickle Family Chair in Breast Cancer Research at the University of Minnesota Cancer Center.

Formerly with the University of Texas Health Science Center at San Antonio, Yee will lead a research program at the Cancer Center aimed at turning basic science observations into treatment strategies. He says, "I was impressed with the Cancer Center's commitment to growing and enhancing the solid tumor oncology program." Yee adds, "The support and leadership of the University and the community was an important part of my decision to come here."

The chair was funded by donations from Robert and Richard Tickle and Marilyn Tickle Bryant. According to Bryant, she and her brothers wanted to make a concentrated effort to do something on behalf of family and friends who have died of cancer. "I made it clear that we wanted someone of the highest caliber who can make a big contribution to the field; I think we have that person in Dr. Yee," she says.

Endowed chairs are established with gifts of $1 million or more. Dollars generated from an endowed fund directly support research activities by funding equipment purchases, graduate student assistance, manuscript preparation, library services, and other requirements of scholarly work. Being named to an endowed chair is one of the highest honors a faculty member can receive.

The University of Minnesota Cancer Center is a National Cancer Institute Designated Comprehensive Cancer Center. More than 350 faculty and staff are associated with the Cancer Center and bring in more than $40 million a year in research funding.

Douglas Yee, M.D.

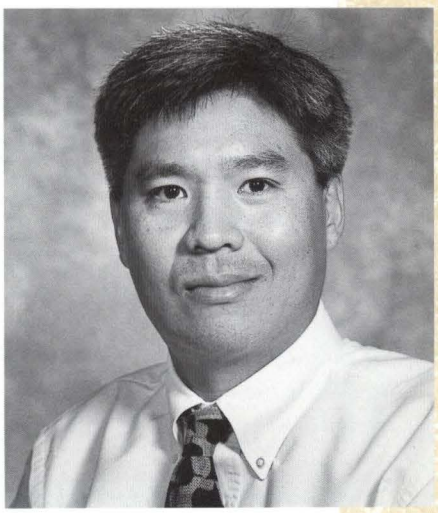
A gift from the estate of ***Louis and Florence Kitsis*** has been made to the Louis and Florence Kitsis Endowed Cancer Research Fund.

A gift from the late ***Dr. Harold J. Lawn*** will support the Harold Lawn Psychiatry Library Fund. Dr. Lawn was in the Class of 1934 at the University of Minnesota Medical School.

A gift from ***Murlan J. Murphy, Sr.***, Shaker Heights, Ohio, will support the research of Dr. Henry Buchwald.

Dr. Frederick M. Stark, Sioux City, Iowa, has given a gift to the Frederick M. Stark, M.D., Endowed Fund. Dr. Stark was in the Class of 1940 at the University of Minnesota Medical School.

Dr. Alvin D. and Ruth D. Wert, Portland, Oregon, established the Dr. Alvin and Ruth Wert Charitable Gift Annuity 1999, which supports the Ruth D. and Alvin D. Wert Endowed Scholarship.



AFFILIATES OF THE MINNESOTA MEDICAL FOUNDATION

are volunteer-based organizations that support health-related research, education, and community outreach. Through the contributions of many volunteers and benefactors, significant advances have been made in many areas such as diabetes, cancer, Parkinson's disease, childhood diseases, and women's health issues.

Improving Breast Cancer Therapy

Cancer Center

Researchers at the University of Minnesota Cancer Center are investigating a new therapy for some forms of advanced breast cancer. It combines the anti-cancer agent Herceptin, which made headlines last year as the first antibody therapy that attacks specific cancer cells, with IL-2, a drug that boosts the body's immune system.

Cells commonly communicate with one another by expressing a protein that gives instructions to other cells. Herceptin attaches to a particular protein, her2neu, which is expressed by some breast cancer cells. Once attached, Herceptin kills the cell. Drs. Tanya Repka and Jeffrey Miller in the Department of Medicine believe that by boosting the activity of the immune system's natural killer cells with IL-2, the Herceptin therapy will be even more effective.

"Advances in cancer survival often come through small improvements to existing therapies. While Herceptin works for some women whose cancer cells express the her2neu protein, in others, the cancer returns. We're hopeful that adding IL-2 to the treatment will forestall the cancer's return," Miller says.

Approximately 25 to 40 percent of breast tumors overexpress the her2neu protein and would be a suitable target for this therapy. To learn if you may be eligible for this trial, call Juliette Gay, R.N., at 612-625-2956.

To learn more about advancements in cancer research at the University of Minnesota Cancer Center, visit the website at www.cancer.umn.edu or call 612-626-5437.

The Masonic Cancer Research Building

Supporting Families

Variety Children's Association

Variety Children's Association celebrates its 65th anniversary this year. In keeping with its tradition of service to children and families, Variety, in partnership with KDWB Radio, is pleased to announce a combined $2.5 million pledge to create the new KDWB-Variety Family Center.

The Family Center, opening in November 1999, consolidates many critical services of the University of Minnesota's Division of General Pediatrics and Adolescent Health. The Family Center supports the medical, psychological, and social needs of families whose children live with chronic illnesses and disabilities. By centralizing services, families will receive high-quality care in a convenient and accessible facility. The new location in the University's Gateway Center will allow for existing program expansion and the addition of new services.

KDWB has been a partner with Variety Children's Association for the past five years. Through special events and promotions, KDWB has already raised $700,000 toward its pledge of $1.3 million. On Monday, June 21, University of Minnesota President Mark Yudof will honor KDWB Radio and Variety Children's Association at a luncheon to be held at Yudof's Eastcliff residence.

For more information, contact Sandy Landberg at 612-624-6128.

Visual Rehabilitation Center

Vision Foundation

Mary Ruff demonstrates how special equipment magnifies objects. Photo by S. Esbjornson.

In the fall of 1998, the Vision Foundation received a generous contribution from Bernice S. Olson in memory of her sister, Mildred Olson. Bernice grew up watching her sister overcome the challenges of vision loss. At age 10, Mildred received an eye injury that permanently impaired her vision. Eventually her other eye developed cataracts, leaving her totally blind for the last 15 years of her life.

Bernice was proud of her sister's strength in managing her vision loss. For 30 years, Mildred taught the blind in Minneapolis. In addition to regular classes, she taught Braille to children in grades 1-6. Mildred believed strongly in educating children and their families about resources available to the blind. When Mildred passed away, Bernice knew that a gift to the Vision Foundation's Visual Rehabilitation Center (VRC) would be a fitting memorial for her sister.

Located on the ninth floor of the Phillips-Wangensteen Building at the University of Minnesota, the VRC opened in January. Clients are trained to use adaptive devices and techniques to enhance their vision and maintain an independent lifestyle. A model kitchen gives the opportunity to explore home adaptations and cooking safety. Clients are also able to test equipment such as handheld magnifiers, closed-circuit televisions that display print on a monitor, and computer software programs that provide screen magnification. Non-optical devices such as large-print calendars, checks, and address books are also available to try. Low-vision clients face many challenges as they adapt to their vision loss and seek ways to continue to live full lives. Bernice's gift to the VRC honors the memory of her sister and brings hope and help to visually impaired patients.

For more information, contact Jennifer Soderholm at 612-625-9613, or visit the Department of Ophthalmology's website at www.med.umn.edu/ophthalmology.

UNIVERSITY OF MINNESOTA
ALUMNI ASSOCIATION

UMAA milestone reached

Thanks to the support of University of Minnesota alumni around the globe, the University of Minnesota Alumni Association has hit the 40,000 member mark for the first time ever! With a goal of 50,000 members by the year 2000, the UMAA is on its way to becoming a stronger association, which means the ability to offer members more benefits, be a stronger University advocate, and offer increased support to today's students and faculty.

You can play a role in enhancing the University's bright future by joining the UMAA. In addition to demonstrating your support for the U, membership also provides considerable benefits. UMAA members keep up to date on developments at the University through *Minnesota* magazine and get discounts on everything from select cultural and athletic events to University Bookstores merchandise. They enjoy travel and lodging discounts, get special access to resources such as the University library, and enjoy special Internet/e-mail access rates.

The Medical Alumni Society is an affiliate of the UMAA. By joining, you help support Medical Alumni Society initiatives like Reunion Weekend and the recent renovation of the Adytum, the study lounge for medical students on the Twin Cities campus.

Your membership truly makes a difference. For more information, call 612-624-2323 or 1-800-UM-ALUMS (862-5867) or visit the website at www.umaa.umn.edu.

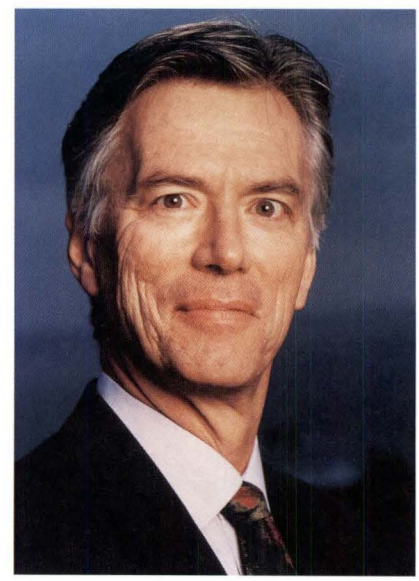
Alumni Recognition Award given

Dr. Richard L. Stennes, Class of 1969, has been named recipient of the second annual Alumni Recognition Award, given by the Medical Alumni Society in recognition of exemplary achievements in the community or field of medicine, or for outstanding service to the University of Minnesota Medical School in the past five years.

Stennes is considered a pioneer in the field of emergency medicine, helping set the standard for emergency physicians and shaping the specialty into its current level of excellence. A San Diego resident, he maintains strong ties to the Medical School and has hosted numerous University alumni receptions in his California home and at the family resort near Bemidji, Minnesota. He is a mentor to medical students and an enthusiastic spokesperson for the Medical School.

Stennes currently holds a number of clinical and academic appointments, including director of Emergency Services at Paradise Valley Hospital and coordinator of Emergency Medical Services at Scripps Hospital East County (both near San Diego), medical adviser to the San Diego County Sheriff's Medical Services, affiliate faculty for the American Heart Association, and academic consultant at the Naval Hospital, San Diego. He has served as president of the American College of Emergency Medicine and is active in the Emergency Medical Section of the American Medical Association.

"I am truly honored to receive the 1999 Alumni Recognition Award," says Stennes. "The University of Minnesota is recognized throughout the world as one of the great institutions of higher learning. It gave me the opportunity to be a physician. My parents, the people of the great state of Minnesota, the students, faculty and administration, alumni and benefactors of the University, and my colleagues in emergency medicine are responsible and recognized for making it possible for me to receive this Alumni Recognition Award. May each and every one of them share it with as much pride and appreciation as I do."



Dr. Richard L. Stennes

ALUMNUS IS NOBEL PRIZE WINNER

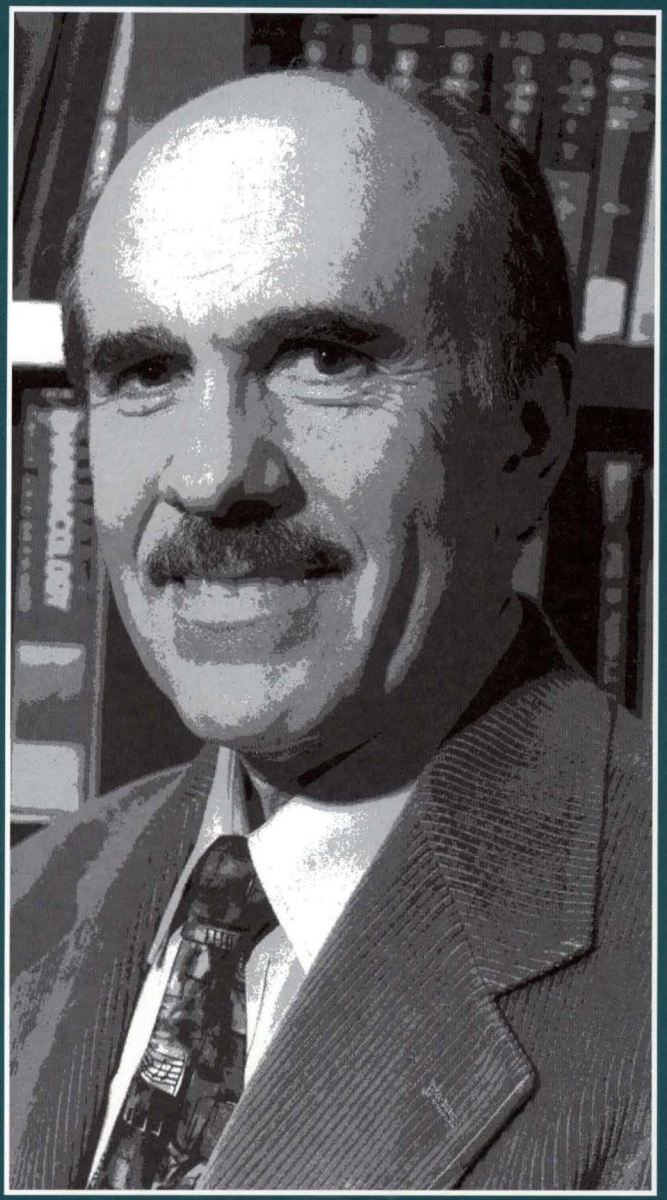
Louis Ignarro, Ph.D., University of Minnesota alumnus and one of three winners of the 1998 Nobel Prize in Physiology or Medicine, returned to the University on May 27 to speak and receive the F.E. Shideman Distinguished Alumnus Award. Ignarro received a doctorate in pharmacology from the University in 1966.

He won the Nobel Prize this past October for his contributions to the concept that a simple gas, nitric oxide, could act as a signaling molecule in the body to promote the dilation of blood vessels. This knowledge served as the basis for, among other things, the development of the anti-impotence drug Viagra.

Ignarro is the only University of Minnesota graduate to receive the Nobel Prize in Physiology or Medicine. He joins 14 previous Nobel winners affiliated with the University, five alumni and nine faculty.

The Shideman Award recognizes graduates of the Department of Pharmacology who have made outstanding contributions to pharmacological knowledge. Frederick Shideman led the department from 1962-87 and was Ignarro's thesis adviser.

Ignarro taught at Tulane University from 1973-85 and then became a professor at UCLA. The recipient of numerous teaching awards from UCLA's School of Medicine, he founded the Nitric Oxide Society and the journal ***Nitric Oxide Biology and Chemistry.***



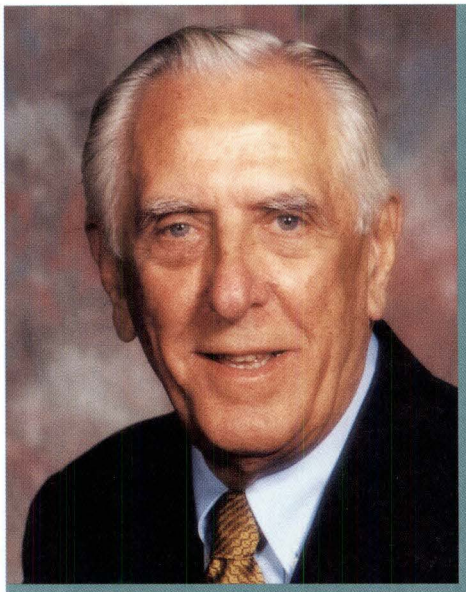
Louis Ignarro, Ph.D., University of Minnesota alumnus and Nobel Prize winner.

Reunion Weekend 1999 on the Internet

Reunion Weekend 1999 was a fun-filled celebration with members of the classes of 1939, 1944, 1949, 1959, 1964, 1969, 1974, and 1989 participating. The festivities included stimulating presentations by deans and faculty members, tours of campus and other Twin Cities sites, an entertaining Deans' Dinner program, and lively class dinners in downtown Minneapolis. To check out photos and quotes from the weekend, visit our website at: www.med.umn.edu/mmf/alumni/1999ren.htm !

Diehl Award winners announced

Three prominent Minnesota physicians have been named recipients of the 1999 Harold S. Diehl Award, given by the University of Minnesota Medical Alumni Society in honor of the Medical School's fifth dean, Dr. Harold Sheely Diehl. These prestigious lifetime awards are granted to individuals who have made outstanding professional contributions to the Medical School, the University, and the community. They were presented June 4 during Reunion Weekend.



Dr. B.J. Kennedy is often referred to as the father of medical oncology. He has dedicated his life to cancer education, research, and treatment. A 1945 graduate of the University of Minnesota Medical School, he is Emeritus Regents' Professor of Medicine and Emeritus Masonic Professor of Oncology at the Medical School.

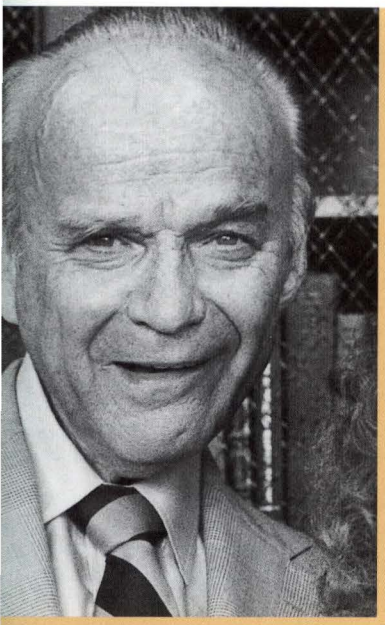
Kennedy is a world-renowned oncologist who built one of the most successful training and research programs in the country at the University of Minnesota. He is recognized for his scientific research and treatments in cancers of the breast, testis, and endometrium; for his work with leukemia and lymphoma, including Hodgkin's disease; and for his research into chemotherapy for neoplastic diseases. He established the concept that prolonged control and cure of cancer is possible with chemotherapy alone in disseminated adult solid tumors. He has actively emphasized the new subspecialty of geriatric oncology.

Kennedy is past president of the American Society of Clinical Oncology and the American Association for Cancer Education, and has been honored by numerous organizations including the American Cancer Society and the American Medical Association.

"When I was a medical student I knew Dr. Diehl as a supporter of first-class medical education for the students," says Kennedy. "And he knew how important it was to provide adequate study facilities. When later he was vice president of the American Cancer Society, I appreciated his strong personal support of my career in that society. It is a great honor to receive the award that recognizes his contributions to medical education."

Dr. Ben P. Owens of Hibbing, Minnesota, has been instrumental in the growth of the Hibbing medical community and active in numerous civic programs. A 1947 graduate of the University of Minnesota Medical School, he has made outstanding contributions to his patients and to the field of family medicine. He has had a profound influence on young medical students, encouraging them to become rural family physicians, and has devoted his extensive practice to meeting the multiple needs of patients on the Iron Range.

Owens is very proud of his medical degree from the University of Minnesota, and feels especially honored to receive the Diehl Award. "The University was a wonderful place to get a medical education. The faculty was outstanding, and our Class of 1947 was one of the very best," he says. "Dr. Diehl was the dean when I was a medical student, and he really put the University of Minnesota Medical School on the map. When I was in the service



Dr. C. Walton Lillehei's pioneering work in the field of open-heart surgery has had a global impact, and his innovations have set the pace for thousands of cardiac surgeons who have followed in his path. As professor of surgery at the University of Minnesota from 1951-67, he has been involved in numerous medical "firsts," including the world's first successful open-heart surgery, the development of the first clinically reliable bubble oxygenator, and the first use of cross-circulation for cardiopulmonary bypass.

Called the father of open-heart surgery, he has trained many of the world's most well-known cardiac surgeons, has authored hundreds of scientific publications, and is one of a handful of researchers who pioneered Minnesota's Medical Alley, a consortium of approximately 500 medical technology companies which has created one of the state's major industries.

Lillehei has received numerous awards for his work in the area of cardiac surgery, and even after his retirement has continued to make significant contributions to the field, including serving as director of medical affairs at St. Jude Medical, Inc. in the Twin Cities.

"Dr. Lillehei has served as a role model for every successful heart surgeon," says Dr. Sara Shumway, professor of surgery at the University. "He has been involved in the evolution of heart surgery from its infancy onward. No single individual that I know of has made more significant contributions to the Medical School, medicine in general, or this community."

in World War II and in Korea, everyone knew about the University of Minnesota because of Dr. Diehl and the excellent faculty. His son, Dr. Anthony Diehl, was in my class." Owens was elected to Alpha Omega Alpha, the national medical honor society, as a medical student.

In 1982 Owens was selected as Doctor of the Year by the Minnesota Academy of Family Practice, and in 1993 received the Distinguished Service Award from the Minnesota Medical Association.

He is now medical director of a large nursing home and is education chair of the University of Minnesota Medical Center – Mesabi in Hibbing. He also serves as a senior American Medical Association delegate.

Medical School classmate Dr. Jim Flinn from Redwood Falls, Minnesota, says Dr. Owens is an excellent choice for the Diehl Award. "His years of civic and medical leadership make him an outstanding recipient of the award."

Medical Alumni Society Board Members

Eugene Ollila, M.D., '70,
PRESIDENT

Wayne D. Liebhard, M.D., '83,
UMAA NATIONAL BOARD REPRESENTATIVE

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M. Elizabeth "Peggy" Craig, M.D., '45

Kent B. Crossley, M.D., '68

Patrick J. Flynn, M.D., '75

Stanley Goldberg, M.D., '56

Lisa K. Higginbotham, M.D., '95

Thuan V. Ly, 3rd-year medical student

Fred A. Lyon, M.D., '57

Rodney D. McFadden, M.D., '93

Arthur L. Ney, M.D., '77

Joel Oberstar, 2nd-year medical student, Duluth School of Medicine

Gregory Adams Plotnikoff, M.D., '89

Daniel R. Sherry, M.D., '73

Richard Simmons, M.D., '55

Judith R. Smith, M.D., '66

Rebecca Strick, 3rd-year medical student

James J. Suel, 2nd-year medical student

CLASS NOTES

1940

Dr. John R. Haserick, Wayzata, Minnesota, received the Dermatology Foundation's Discovery Award for his research in understanding and treating lupus erythematosus. The award is given to dermatologists who have carried out ground-breaking research with an impact reaching well beyond dermatology.

1962

Dr. Thomas Crowley, Aurora, Colorado, received a MERIT award from the National Institute on Drug Abuse. MERIT (Method to Extend Research in Time) awards are given by the National Institutes of Health (NIH) to investigators who have demonstrated superior competence and outstanding productivity in their research endeavors. He is also an NIH adviser to the World Health Organization Expert Drug Abuse panel. A professor of psychiatry at the University of Colorado School of Medicine, he recently invented a device called the Ava Lung which allows skiers buried in avalanches to continue breathing.

1970

Dr. Milton Hanson and *Dr. Linda Burns Hanson* ('75), moved to Bucharest, Romania, in 1994, sponsored by the World Mission Prayer League, a Lutheran mission society with offices in Minneapolis. They worked on the Primary Health Care project of World Vision in Cluj, Romania, until 1997, and then established the Open Door Medical Foundation. The Hansons hope to establish a family practice teaching clinic in Bucharest this year.

1985

Dr. Constanza Iriarte, Newport Beach, California, has been named to the Southern California Permanente Medical Group board of directors. Iriarte is a physician in the Head and Neck Surgery Department at the Kaiser Permanente Bellflower Medical Center in Southern California.

1990

Dr. Kristi M. Schoeld, Ventura, California, is job-sharing with her husband Dr. Neil Jorgensen at the Ventura County Medical Center and teaching family practice residents in both outpatient and inpatient settings.

IN MEMORIAM

DR. GEORGE W. ANDERSON, Class of 1937, St. Paul, died May 4 at age 85. An army medical officer during World War II, he retired from the Medical Corps, USAR, in 1961 as a lieutenant colonel. He was a professor of Medicine at Johns Hopkins Medical School for more than 20 years, and medical director at Women and Infants Hospital in Rhode Island. Anderson also taught at Brown University.

DR. GEORGE M. COWAN, Class of 1936, St. Louis Park, Minnesota, died April 26 at age 89. He is survived by his wife, Anita, one son, and one daughter. Memorials are preferred to the Dr. George and Anita Cowan Scholarship Fund at the Minnesota Medical Foundation.

DR. DONALD M. DECOURCY, Class of 1967, St. Paul, died May 12 at age 55. DeCourcy founded the DeCourcy Eye Clinic in West St. Paul in 1976. He practiced ophthalmology and surgery until 1994. An Army captain, he served as an instructor at the Medical Field Service School in San Antonio. He is survived by his wife, Cathy, and one son.

DR. CYRUS C. ERICKSON, Class of 1932, Knoxville, Tennessee, died March 19 at age 88. A specialist in pathology, Erickson was on the faculty at Duke University Medical School from 1937-50. He served three years in the Army Medical Corps during World War II. In 1950, Erickson accepted a professorship in pathology at the University of Tennessee Medical Units in Memphis. He was chair of the Pathology Department from 1968-71, and retired in 1974. Erickson received numerous awards for his research in uterine cancer, and was active in many societies, including the American Society of Experimental Pathology. He received the Distinguished Service Award of the Tennessee State and National Divisions of the American Cancer Society for his outstanding contributions to cancer research. In 1972 he received Duke University's Distinguished Alumnus Award. Erickson is survived by a son and daughter.

DR. DAVID W. FEIGAL, Class of 1947, Salt Lake City, Utah, died October 31 at age 73.

DR. PHILIP FEINBERG, Class of 1939, St. Louis Park, Minnesota, died February 9 at age 83. A specialist in psychiatry, he is survived by his wife, Rebecca, and two sons.

DR. WILLIAM H. "BILL" GOODNOW, Class of 1938, Duluth, Minnesota, died May 3 at age 77. While serving in the U.S. Army Air Corps, Goodnow received premedical training, and was a medical officer in Japan from 1949-50. After eight years of service, Goodnow attended the Medical School, where he was a member of the Alpha

Omega Alpha Honorary Society. He practiced in the Department of Internal Medicine at the Duluth Clinic from 1956 until his retirement in 1986. During this time he also served as chief of staff at St. Mary's Hospital and as president of the Minnesota Society of Internal Medicine. He is survived by his wife, Arlys, one daughter, and three sons.

DR. DENNIS J. KANE, Class of 1955, St. Louis Park, Minnesota, died April 17 at age 79. Kane was the recipient of the Variety Club Fellowship to the National Heart Hospital in London, England. He was the director of medical education at St. Paul Ramsey Hospital in St. Paul, and an instructor in anatomy and associate professor in internal medicine at the University of Minnesota. He entered private practice in 1966, and served as vice president and medical director for North American Life & Casualty Co. until 1984. He retired as a colonel from the U.S. Air Force Reserves. Kane is survived by his wife, Patricia, and one son.

DR. WILLIAM H. LINDBLOM, Class of 1944, Iron Mountain, Michigan, died February 28 at age 81. After finishing medical school, Lindblom served as captain in the U.S. Army Medical Corps from 1945-47 as a regimental surgeon. Upon completion of specialty training in internal medicine, he joined the Veterans Administration Medical Center in Iron Mountain in 1950. He practiced internal medicine for 42 years and retired from the VA Hospital in 1986. He is survived by his wife, Hettie, and five daughters.

DR. REINHARDT L. SCHMIDTKE, Class of 1933, Bloomington, Minnesota, died April 10 at age 92. Schmidtke had a private ophthalmology practice in St. Paul, and was clinical ophthalmologist at the University of Minnesota's Boynton Health Service. Schmidtke established the Schmidtke Chair in Neuro-Ophthalmology at the University of Minnesota. He is survived by his wife, Ruth. Memorials are preferred to the Neuro-Ophthalmology Fund at the Minnesota Medical Foundation.

DR. ELIOT D. SORSKY, Class of 1933, Fresno, California, died July 9 at age 89. Sorsky practiced cardiology in Fresno County for 55 years. He is survived by his wife, Reeva, and one son.

DR. GEORGE T. TANI, Class of 1950, St. Paul, died March 22 at age 83. Following his service in military intelligence during World War II, Tani received his medical degree and completed an ophthalmology residency at the Mayo Clinic. A clinical professor in the Department of Ophthalmology at the University of Minnesota, Tani was president of many professional societies, including the Mayo Clinic Ophthalmology Alumni Association and the Japan America Society of Minnesota. He is survived by his wife, Yoshi, two sons, and one daughter. (See related story on page 32.)

DR. THOMAS E. VANDERPOOL, Class of 1955, Paynesville, Minnesota, died February 15 at age 75. A longtime physician of the Paynesville area, he is survived by two sons and three daughters. Memorials are preferred to the Minnesota Medical Foundation.

Minnesota Medical Foundation Golf Classic coming in August

August 30 marks the 9th Minnesota Medical Foundation Golf Classic. This year's event will take place at the popular Minneapolis Golf Club, home to the Twin Cities' Dayton's Challenge.

The Minnesota Medical Foundation Golf Classic has become an important tradition in the Twin Cities community over the past eight years and has contributed substantially to education and research efforts at the University of Minnesota Medical School. Since its inception in 1991, this event has contributed more than $320,000 to the Medical School. These funds were realized through a combination of corporate sponsors and the loyal participation of hundreds of golfers from throughout the state.

The event is structured as a double shotgun start played in a scramble format, followed by a dinner and program. And for the first time, this year a limited number of spaces will be available during the morning round for players with a handicap of 20 or better to play the course individually in lieu of the scramble format.

The Golf Classic's impact on today's medical students, coupled with the opportunity for a day of friendly competition and camaraderie, is an unbeatable combination. Limited space remains, so be sure to register soon.

For more information or to register, call 612-626-0619 or 1-800-922-1663.

1999 Minnesota Medical Foundation Golf Classic Executive Committee

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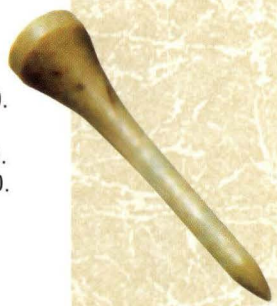

Dr. George Tani's Legacy

George T. Tani, M.D., a renowned St. Paul ophthalmologist and retired clinical professor in the University's Ophthalmology Department, dedicated nearly 60 years of his life to preserving, enhancing, and restoring eyesight.

Dr. Tani died in March, but his legacy will continue for years through the generosity of he and his wife, Yoshi. The Tanis designated income from their endowment to fund scholarships for financially needy students at the University of Minnesota Medical School. George Tani said recently, "The University was very good to Yoshi and me. This scholarship fund is an expression of our gratitude for the excellent medical education I received at the Medical School and for the wonderful life experiences that have accompanied it."

A practicing optometrist before World War II, Tani enrolled in the University of Minnesota Medical School following a stint in the military. He earned his degree on the GI Bill but had to work hard to make ends meet. Following his graduation in 1950, he went on to complete his ophthalmology training at the Mayo Clinic.

The Tani family has always placed a high value on education. In addition to helping sons Paul and Douglas graduate from the University's Medical School, the Tanis helped their son-in-law, Tom Winegarden, earn his medical degree at the University also. Paul and Doug Tani – who joined the Tani Eye Clinic after completing their training – will carry on their father's commitment to visual health.

In 1997, the Tanis established a charitable remainder trust which would provide them an income for both of their lives, and a significant income tax deduction at the time of the gift. Afterwards, this gift will be used to establish the Dr. George T. and Yoshi Tani Endowed Fund at the Minnesota Medical Foundation to help deserving medical students. The couple also designated a portion of their trust to benefit their church and the St. Paul-based HealthEast Foundation.

Dr. George Tani's professional contributions to his colleagues, his patients, and to the University of Minnesota have made a difference in the lives of hundreds of people. His legacy will live on in many ways as a result of the generosity he and Yoshi have expressed through their charitable gifts.

If you would like more information about the tax and income benefits of a charitable remainder trust or about permanent named endowment funds at the Minnesota Medical Foundation, please call the Office of Gift Planning at 612-625-1440 or 1-800-922-1663, or return the adjacent reply card.

Yoshi and the late Dr. George Tani

The Minnesota Medical Foundation is a non-profit organization which raises and disburses funds for medical education and research at the University of Minnesota Medical Schools in the Twin Cities and Duluth and the School of Public Health.

For more information about the Minnesota Medical Foundation or to update your address, call or write: Minnesota Medical Foundation, Box 193 Mayo, 420 Delaware Street SE, Minneapolis, Minnesota 55455-0392. Phone 612-625-1440 or 1-800-922-1MMF. Web address: www.med.umn.edu/mmf

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August 30, 1999
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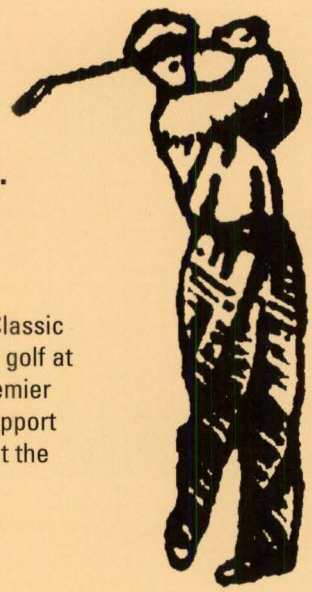

The Minnesota Medical Foundation Golf Classic provides a challenging, enjoyable round of golf at the Minneapolis Golf Club, one of the premier courses in Minnesota. Proceeds go to support health-related education and research at the University of Minnesota.

For more information or to register, call 612-625-1440 or 1-800-922-1663.