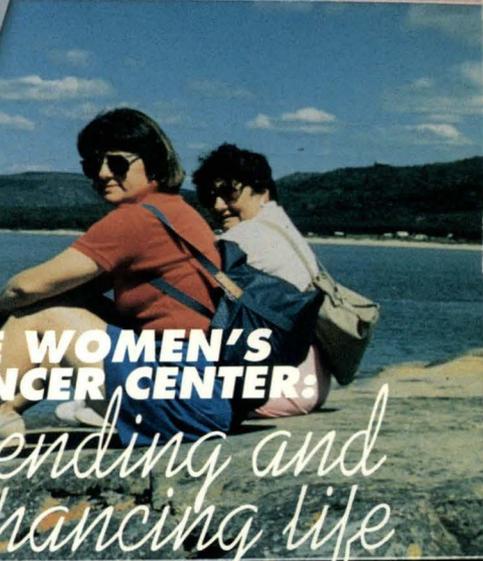
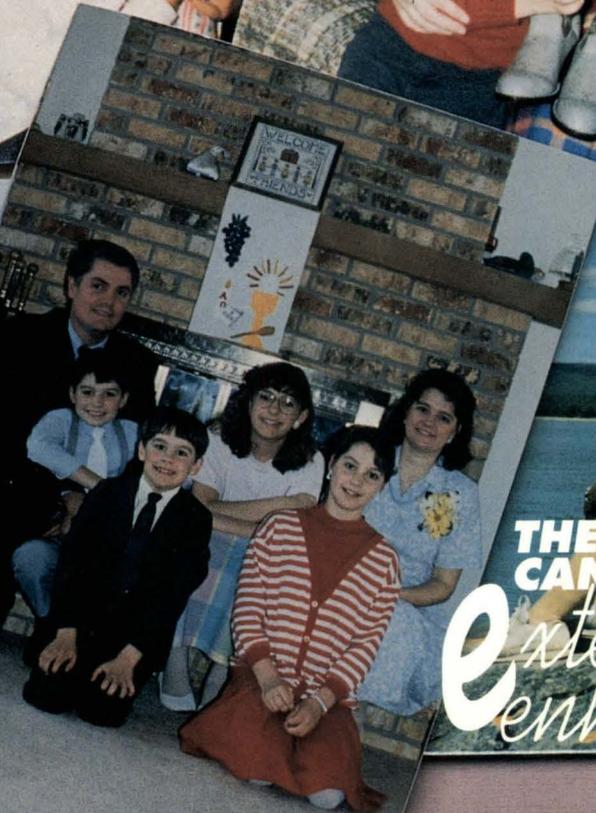
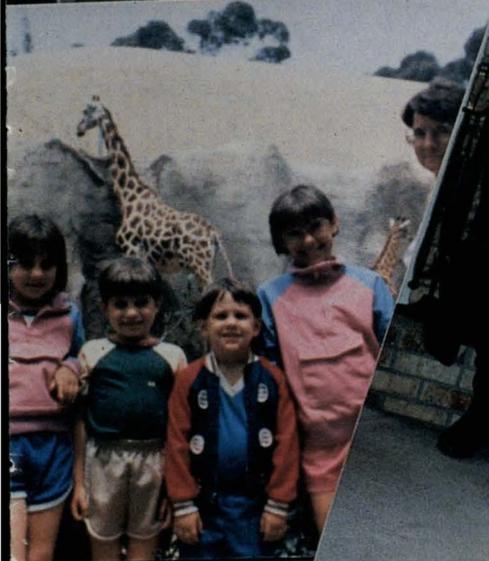
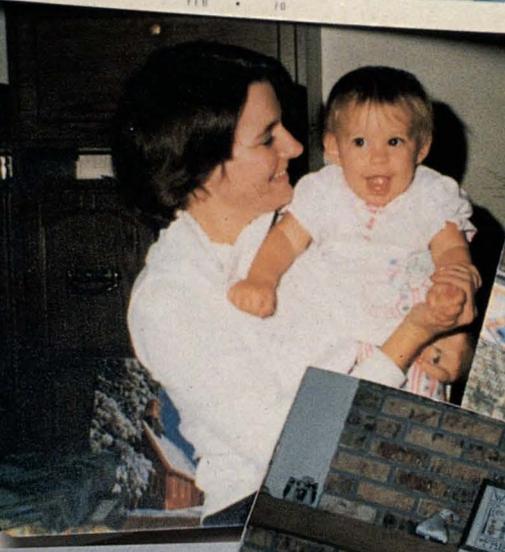
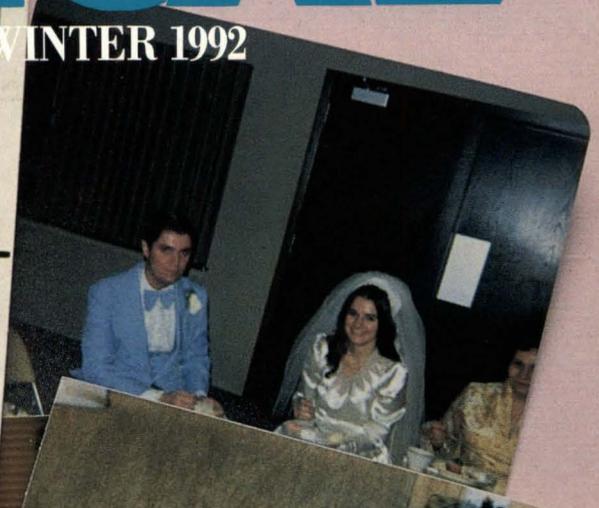
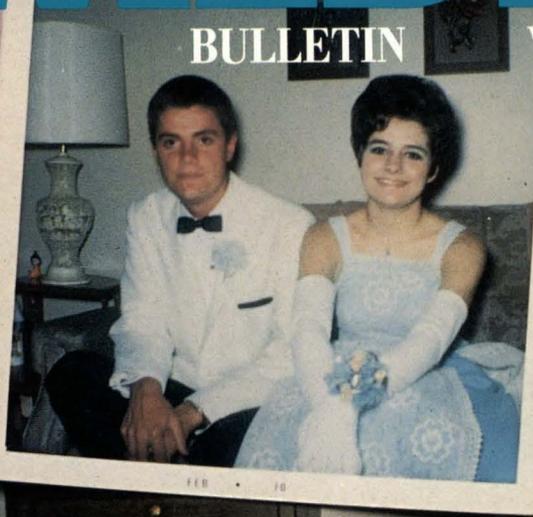


UNIVERSITY OF MINNESOTA

MEDICAL

BULLETIN

WINTER 1992



**THE WOMEN'S
CANCER CENTER:**

*extending and
enhancing life*

A PUBLICATION OF THE MINNESOTA MEDICAL FOUNDATION

UNIVERSITY OF MINNESOTA
MEDICAL
 BULLETIN WINTER 1992

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The Minnesota Medical Foundation was founded in 1939 by a dedicated group of faculty members and medical alumni who saw the need for private support to build a strong future for the Medical School. A non-profit organization, MMF raises and disburses funds for medical education and research at the University of Minnesota Medical Schools in the Twin Cities and Duluth.

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On the Cover: The University of Minnesota Women's Cancer Center—extending life and enhancing its quality.

The Minnesota Medical Foundation supports the research and educational missions of the University of Minnesota Medical Schools by encouraging private contributions.

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Giving with appreciation as the 1991 tax year comes to a close

Appreciation has a special meaning to the Minnesota Medical Foundation as the tax year comes to an end. We appreciate the more than 12,000 people who contributed this year to help the Medical Schools and the School of Public Health fulfill educational, research, and service missions. Thank you on behalf of scholarship recipients and researchers who express their appreciation to the Minnesota Medical Foundation every day for what you have made possible.

We appreciate the hundreds of volunteers who have given time to bring success to the Centennial Scholarship and Cancer Center campaigns. Imagine the appreciation that will be shown in years to come from those who benefit from these endeavors.

And yet, appreciation has another meaning! It also means that capital assets such as stock and real estate have gone up in value and offer a double tax benefit when contributed to the Minnesota Medical Foundation. Our nation's tax laws continue to offer special incentives for gifts of appreciated property. Assuming you have owned stock or property for more than one year, you may count the full market value as a charitable contribution, while avoiding all the capital gains taxes.

For more information about giving gifts of appreciated stock or real estate, contact the MMF Development Office: (612) 625-1440. Gifts can be designated for scholarships or to specific medical research areas.

Gifts of all kinds help, but this year you might want to check your portfolio to see if you can give double meaning to the word appreciation.

David R. Teslow
President & CEO
Minnesota Medical Foundation

THE WOMEN'S CANCER CENTER:

Patients as survivors

State-of-the-art research and treatment methods at the University of Minnesota are greatly improving quality of life for patients.

by Lynn Slifer



Toni Dubuque always thought she would get cancer someday. She wasn't just being fatalistic; both her parents and her grandmother died of cancer. Yet when she heard her own diagnosis of cervical cancer, that fatalism turned to feistiness.

"I decided that I wanted to be as aggressive as possible in treating my illness," Toni says. "I wanted a medical environment that was going to be honest with me and caring about me as a person." When her primary physician referred her to the University of Minnesota's Women's Cancer Center, she found a place that met all her needs.

Toni is not alone. Last year, nearly 4,000 women were treated at the Women's Cancer Center. Established in 1988, the Women's Cancer Center "was created to coordinate the myriad of services both inside and outside the University with the ultimate goal of improving patients' quality of life and survival," according to associate professor and co-director Dr. Linda Carson. Pain management, radiology, chemotherapy, patient education, nutrition, and issues such as physical change, beauty, hair loss, and sexuality are all handled on a case-by-case basis at the Center.

Although only three years old, the Center is actually a natural progression in the research, training, and treatment of gynecologic oncology extending back nearly 60 years. With the arrival of Dr.

John L. McKelvey in 1938, the Department of Obstetrics and Gynecology began to focus intensively on reproductive cancers in women. Ten years later, Dr. McKelvey and his colleagues were achieving a five-year survival rate of 81 percent in women in early stages of cervical cancer.

The Women's Cancer Center maintains these high standards today, achieving some of the country's—and the world's—highest gynecologic cancer survival rates. According to the 1988 *Annual Report on Gynecological Cancer*, the Center had the nation's best five-year survival rates for cervical, ovarian, and vulvar cancer, and was second in the country for endometrial cancer.

Diagnosing ovarian cancer

The statistics are encouraging and, in fact, mortality rates over the past 30 years for cervical and endometrial cancers have decreased dramatically, primarily because of the use of Pap tests for early detection. However, ovarian cancer remains a critical problem. Much of the current research being conducted now by faculty in the Department of Obstetrics and Gynecology focuses on ovarian cancer.

According to Dr. Mark Moradi, a research fellow and instructor, "one out of 70 newborn girls in the United States will develop ovarian cancer as an adult. The biggest problem with ovarian cancer



PHOTOS BY NANCY MELLGREN

Toni Dubuque, left, Women's Cancer Center volunteer and former patient, talks with current patient Laurel Larson.

is that we have been unable to develop a good way of diagnosing it early enough to save patients."

In fact, Toni Dubuque's experience is atypical for ovarian cancer patients. Originally diagnosed for cervical cancer, Toni found out after surgery that she also had ovarian cancer. She is fortunate. Diagnosed in the early and localized stage, four out of five ovarian cancer patients survive five years or more. More common is a diagnosis in the advanced states, when the cancer has already metastasized. Only one out of five of these patients survive.

Ovarian tumors are hard to detect because they are deeply imbedded in the pelvis and there are no clear, early symptoms of the disease. Current detection methods used in the Women's Cancer Center include a vaginal probe ultrasound that allows physicians to view the ovaries up close. In addition, women at risk for ovarian cancer because of family history can be given a blood test that screens for elevated levels of a particular protein, CA125.

Because Toni Dubuque's mother and grandmother died of cancer, and Toni had ovarian cancer, her two sisters are coming in for regular CA125 tests, pelvic exams, and vaginal ultrasound. However, these tools are only useful when a problem is suspected, or a woman has a family history of ovarian cancer, indicating the need for closer follow-up.

Research: The key to patient survival

It is clear that scientists and doctors need to know much more about ovarian cancer. Dr. Carson and other faculty members are working collaboratively in this critical area of research with Dr. Sundaram Ramakrishnan, who holds a joint appointment with OB/GYN and Pharmacology. According to Dr. Ramakrishnan, "The problem we face in cancer treatment is not the removal of the tumor—surgeons are very good at that. The problem remains with the residual tissue we leave behind."

Three major research efforts are underway. The first area of concentration is research on proteins unique to specific cancerous tissues. Once these proteins are identified, scientists can link toxins or radioactive substances to these proteins—creating, in effect, a "magic bullet" that will seek out and attack cancer cells without affecting healthy tissue. This treatment method could overcome two problems currently faced with conventional chemotherapy: side effects due to drug toxicity and an eventual resistance to the drugs so that they lose their cancer-fighting effectiveness.

In addition, identification of these proteins can expand the usefulness of tests such as the CA125. Currently the CA125 protein test is only 85 percent effective in women with ovarian cancer. For the

remaining 15 percent, protein levels remain flat and the test doesn't work at all. Identifying a range of additional protein indicators would greatly aid in the diagnosis of ovarian and other types of cancer.

Research is also being conducted on the mechanisms by which tumor cells evade the body's immune system. It is known that women with cervical cancer, for example, have lowered immunity, but it is not clear which comes first—the cancer or the decreased immune response. If those mechanisms that suppress the body's natural immune response to abnormal cells can be identified, new treatments can be developed to counteract this process and allow the body to suppress the cancerous cells naturally.

There is also evidence that the pain-relieving narcotic, morphine, may decrease the body's immune response. This is especially significant because many cancer patients are treated with morphine-based drugs. Faculty researchers are examining whether such a connection exists.

A third research project focuses on factors influencing tumor metastasis. Scientists are examining ascitic fluids in the abdomen to determine their influence on tumor spreading. Metastasis is modeled by creating an artificial membrane and



THE WOMEN'S CANCER CENTER:

allowing ovarian cancer cells to "migrate" through this membrane. As this "migration" phenomenon is better understood, treatment strategies can be developed to contain cancer in its original site, thus greatly improving the cancer patient's rates of survival.

Longterm research commitment: An endowed chair

Research is vital, but continued progress in women's cancer research is uncertain in this era of decreasing research funding and market-driven medical priorities. Thus the Department of OB/GYN has made a commitment to securing the funding necessary to endow a faculty position in women's cancer research. Creation of this chair will give the department and the faculty the ability to respond to new research challenges and innovative opportunities as they appear. More importantly, a permanent position focused on basic scientific research and

Dr. Jonathan Carter demonstrates the ultrasound equipment used at the Women's Cancer Center.

the clinical application of that research is critical, and will ensure a long-term institutional commitment to finding solutions to cancers affecting women.

A range of treatment options

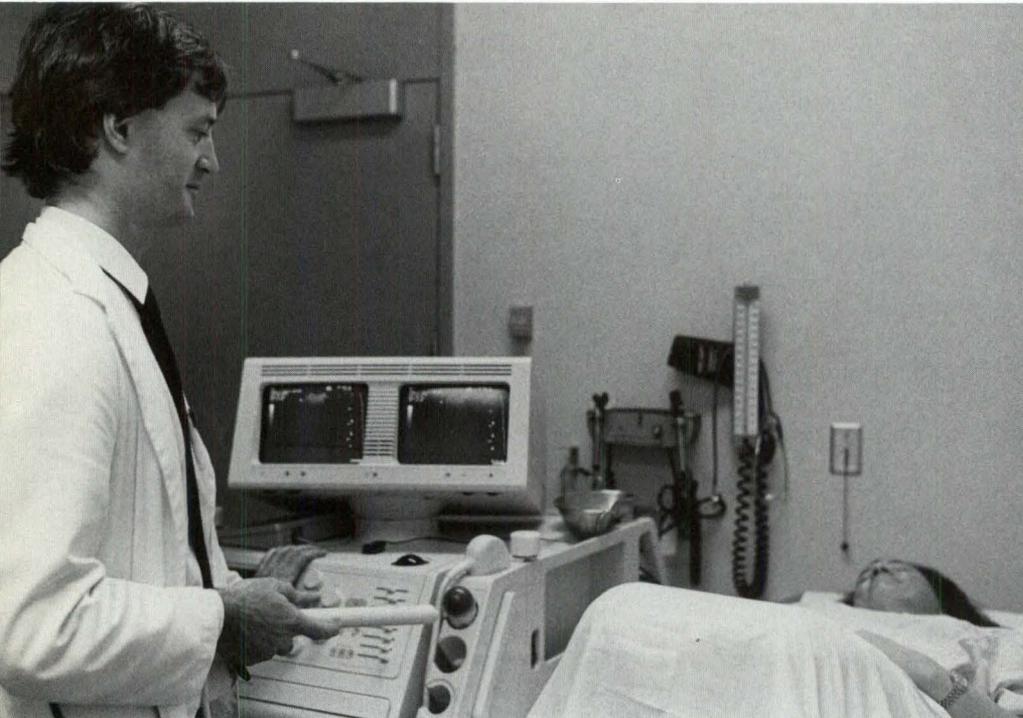
A clear strength of the Women's Cancer Center is its participation in national clinical research trials on experimental treatment options. Selected medical centers nationwide participate in this project, supported by the National Cancer Institute, by collecting data on which treatment combinations are the most successful with different types of female reproductive cancers. For example, some advanced-stage ovarian cancer patients are being treated with the recently publicized and scarce drug, taxol, produced from the bark of yew trees.

"These clinical trials allow the medical staff at the Women's Cancer Center to be very aggressive in cancer treatment by giving us a whole range of new treatments to work with," says professor and co-director Dr. Leo Twiggs. "Our patients have other options if first-line therapy fails." Many of these treatments, including certain kinds of chemotherapy and immunotherapy, are not yet widely available.

Quality of life an important component

Statistics and research can't personalize the reality of actually experiencing cancer, and the frequently debilitating effects and frightening physical changes caused by surgery, radiation, and chemotherapy. The quality of patients' lives as well as the success of their medical treatments is a high priority for the Women's Cancer Center staff.

Dr. Carson is working with psychologists Linda Hammer-Burns and Sue Petzel to find ways to measure quality-of-life factors in women cancer patients. Goals of the study include finding out how well women cancer patients are coping psychologically with the disease and treatments, how psychological needs could be better addressed, and learning if there is any correlation between different chemotherapy treatments and patients'



Women's Cancer Center is world leader

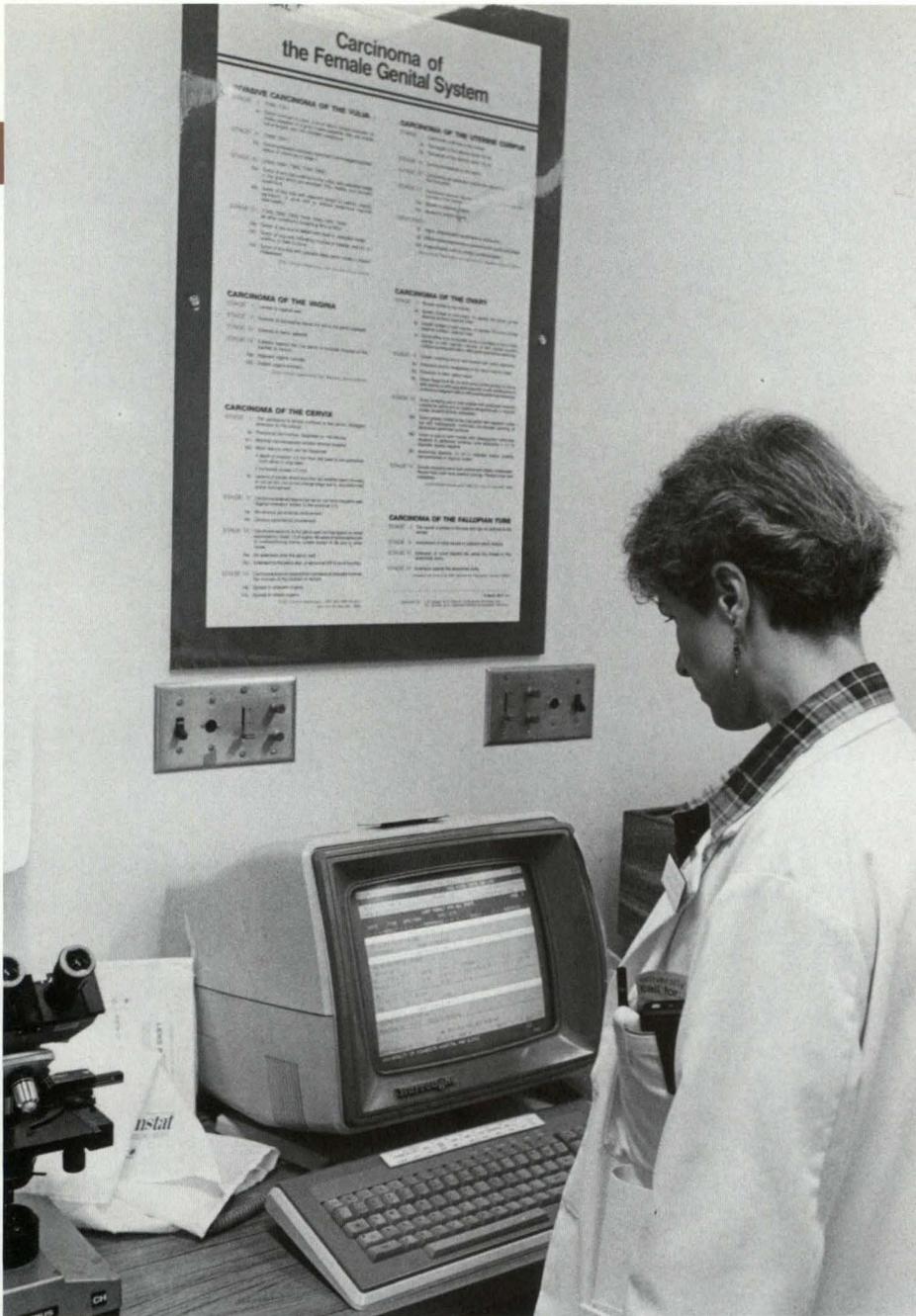
The University of Minnesota Women's Cancer Center has some of the country's and the world's best gynecological cancer survival rates, according to the most recent (1988) statistics available from the *Annual Report on Gynecological Cancer*. Five-year survival rate data from 139 worldwide medical centers, including 19 U.S. centers, regarding cervical, endometrial, ovarian, vulvar, and vaginal cancer, were examined.

Survival rates for the University's cervical cancer patients, including those with cancer in various stages, were the best in the nation with 72.4 percent of patients alive five years after diagnosis. The average worldwide five-year survival rate for such patients is 53.5 percent.

For endometrial cancer, the University had the country's second-best five-year survival rate, with 74.5 percent of patients alive five years later. The average worldwide rate is 65 percent.

University survival rates for ovarian cancer were the best in the United States. Five-year survival rates were 50.7 percent; the worldwide five-year survival rate is 39.4 percent.

Five-year survival rates for vulvar and vaginal cancers were 66.7 percent, compared with a worldwide survival rate of 47.3 percent.



Cathy Rose, nurse practitioner at the Women's Cancer Center.

quality of life and coping skills.

Another way the Center addresses quality-of-life issues is through a volunteer and education program. Toni Dubuque's experience with cancer was intensified by having watched both her mother and father die within a year of each other.

"When my mom died," Toni says, "the doctors never really told us what was going on and we didn't know what questions to ask." When Women's Cancer Center Coordinator Paula Forte approached Toni about becoming involved in a one-on-one volunteer pro-

The Center has the nation's best five-year survival rates for cervical, ovarian, and vulvar cancer, and was second in the country for endometrial cancer.

gram with cancer patients, Toni was enthusiastic.

"It's nice to talk to doctors and nurses," Toni stresses, "but there are always questions that you forget to ask and it would be nice to talk to someone who has been through what you are facing."

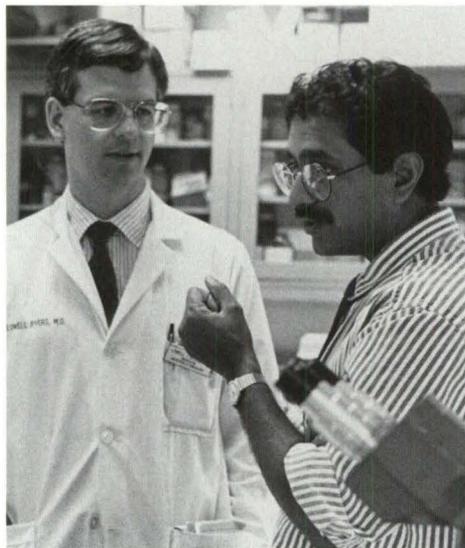
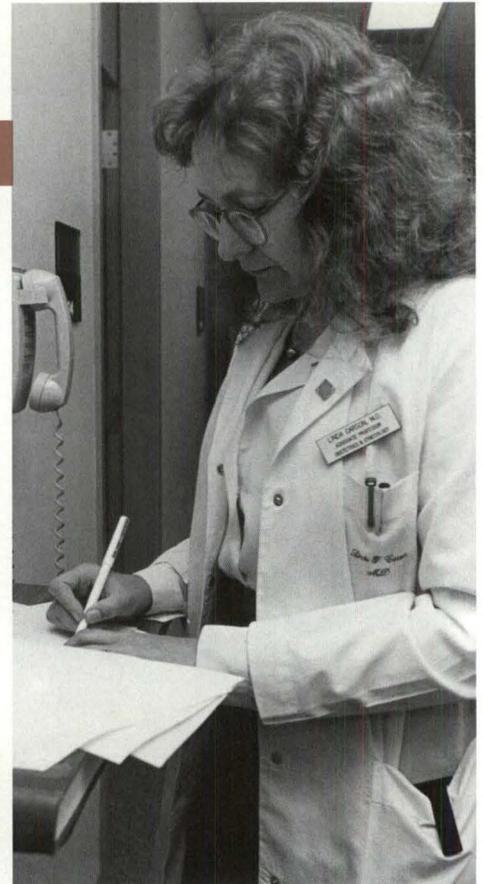
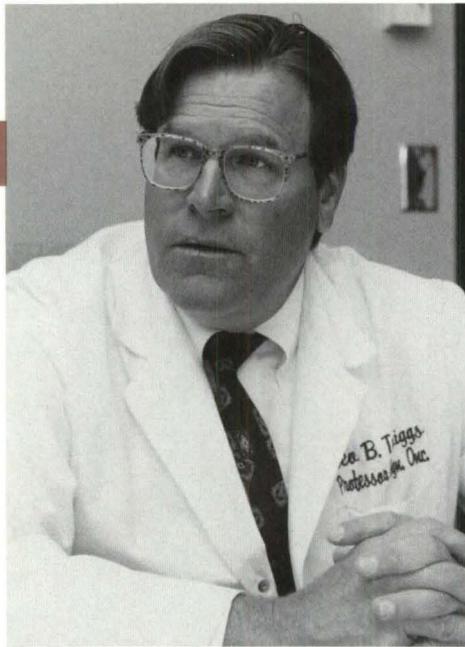
The conversation with Forte eventually led to the development, last year, of the Women's Cancer Center's Life Enhancement Program. A core group of about ten volunteers (all of whom have had cancer or have had close personal experience with cancer) visit with patients one-on-one to answer questions, educate, and give emotional support. According to Toni, the volunteer experience is very rewarding.

"I feel so lucky that I can do something for someone else. It's not only what I give, it's what I get back. It's an education for me too." Toni believes that as the program progresses, the volunteers can do more to help the Women's Cancer Center and the patients with suggestions for patient comfort, clinic efficiency, and other issues.

The Life Enhancement Program also provides patients with information on psychological counseling and sexuality. Beauty experts have been brought in to work with patients on image enhancement such as showing ways to attractively disguise hair loss.

The Women's Cancer Center's collaborative approach—combining the best multi-disciplinary medical treatment available with attention to patients' emotional, physical, and psychological needs—is geared, above all, to women surviving cancer in the most healthy and positive ways possible. Toni Dubuque is one of many patients who sees herself as a survivor. Toni sums it up when she says, "I feel confident that I got the best treatment and everyone I talked to was just very caring about me personally. Now that I've dealt with cancer, I figure that whatever comes, I will address it when I get there." 

Lynn Slifer is director of development for the Department of Obstetrics and Gynecology.



Clockwise from above left: Drs. Leo Twiggs and Linda Carson, co-directors of the Women's Cancer Center. Dr. Sundaram Ramakrishnan (right), researcher specializing in women's cancer, consults with research fellow, Dr. Lowell Byers.

The Women's Cancer Center was created to coordinate the myriad of services both inside and outside the University with the ultimate goal of improving patients' quality of life and survival.

MEDICAL INNOVATION

The *genesis* of Minnesota's Medical Alley

*Minnesota inventions have had a
world-wide impact on health care.*

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by Michael P. Moore

Minnesota is home to more than 500 medical companies and health care organizations, most of them located in a geographic swath—the Medical Alley—that starts in Duluth and cuts through the Twin Cities area down to Rochester. This \$7 billion industry is Minnesota's leading employer and is still growing faster than any other. What started this Minnesota version of Silicon Valley, and what is fueling its growth?

In the view of C. Walton Lillehei, Ph.D., M.D., the University of Minnesota's "Father of Open-Heart Surgery," the seminal event took place in 1956. He had just finished dismissing a graduate student who was making no progress on a critical new medical device when a young electronics repairman happened to pass by his office. Lillehei was familiar with the young man's skill in repairing the electrocardiograph machine in the University of Minnesota Hospital operating room, so he took a chance that he might have the ingenuity to succeed

where the Ph.D. student had failed. "Hey Earl, I've got a problem for you," Lillehei called out as the young man passed by.

The problem Lillehei had in mind was to figure out how to build a battery-powered device small enough to be worn on a patient's belt yet able to deliver a regularly paced current through a wire to the surface of the patient's heart. Surgeons were desperate for such a device to treat usually fatal heart block that was occurring in patients following open-heart surgery, which Lillehei pioneered in the early and mid-1950s with surgeons F. John Lewis, Mansur Taufic, and Richard Varco. No effective treatment existed, only temporary measures such as giving epinephrine or isoproterenol to try to speed up the heart in hopes that the block would revert spontaneously within the first week or two.

As it had many times during the development of open-heart surgery techniques, the dog lab led to a solution. "We were able to reproduce heart block very simply by clamping the inferior vena cava

and emptying the heart of blood and then putting a stitch around where we knew the conduction system was," Lillehei says. "One of the ways that had been advocated to treat heart block was direct shock to the chest. We tried that in dogs—and in a few of our patients because we were desperate—but it took 60 to 75 volts to stimulate the heart and we needed to give 60 shocks per minute, which caused an intolerable amount of pain. In some of the infants we were able to keep them alive for two to three days, but blisters would form under the electrodes and the blisters would break and become infected . . . it was totally unsatisfactory. But, that led to the thought of putting a wire right on the heart, and when we tried this in dogs all you needed was 1-2 volts, which was imperceptible to the animal and obviously would be to the patient. This low voltage gave complete and effective control of the heart rate and output of blood."

So in January 1957 Lillehei's surgical team began using direct heart stimulation



Earl Bakken, co-founder of Medtronic, Inc., designed the first external pulse generator.

him to see the heart block procedure in the dog lab with one of my residents, Vincent Gott. Six weeks later he was back with a box four-inches square by two-inches high, and it worked great in the dog laboratory. We were soon equipping all our heart-block patients with the device, which they wore in a holster."

Bakken's success with the battery powered pacemaker was partly due to his training in transistor technology in the Department of Electrical Engineering at the University of Minnesota Institute of Technology (class of 1948), and partly due to the skill with medical devices he had developed in the garage-based electronics repair business he ran with his brother-in-law, Palmer Hermundslie. The two were soon able to move their company, Medtronic, Inc., to a larger building thanks to referrals from Lillehei. "As I went around the country describing the

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to successfully treat heart block in a young girl operated on for closure of a ventricular septal defect. "We used a Grass Physiological Stimulator borrowed from Dr. Jack Johnson in the Physiology Department, and it was successful in 38 patients over about the next year. This method of electrical stimulation of the heart was a dramatic success. The 100 percent mortality of heart block was changed to an 89 percent survival rate. As the swelling around the surgical stitches in the vital regions of the heart subsided, the heart block often disappeared. Before the electrical stimulation the patients died before this could happen," Lillehei says.

The team even developed a method of attaching the device without opening the chest, by feeding the wire through a hollow needle to the heart, enabling them to save patients who experienced sudden heart block in the days following surgery. Still, the solution was not completely satisfactory, because the device had to be plugged into an electrical source, severely limiting patients' mobility and leaving them at risk of a power failure or accidental electrocution.

Lillehei thought that since only a small current was required, it ought to be possible to make a battery-powered pacemaker. "I talked to a student who was

This \$7 billion industry is Minnesota's leading employer and is still growing faster than any other.

working on his Ph.D. in the electrical division of the physics department and said I needed a device that patients could wear on their belt, that would be battery powered and be able to supply a low voltage current at an adjustable rate of 50 to 110 pulses per minute. He said he could do it, but after six months of hearing vague assurances that he was making progress I finally pinned him down, and he didn't have anything."

That was when Earl Bakken happened by on his way to fix the EKG. "The hospital did not want electricians to go into the operating room, so we had found a young man with an electronics repair business and gave him a part-time contract to repair our devices. I remember Earl Bakken always wore a plaid workshirt and always got the job done right away," Lillehei says. "So I described the problem to him and he said sure, he thought he could do it. So I arranged for

low mortality rate we had established in our open-heart surgery program, everyone wanted to know what we were doing for heart block. I'd tell them, 'Call Earl Bakken, he'll help you.' "

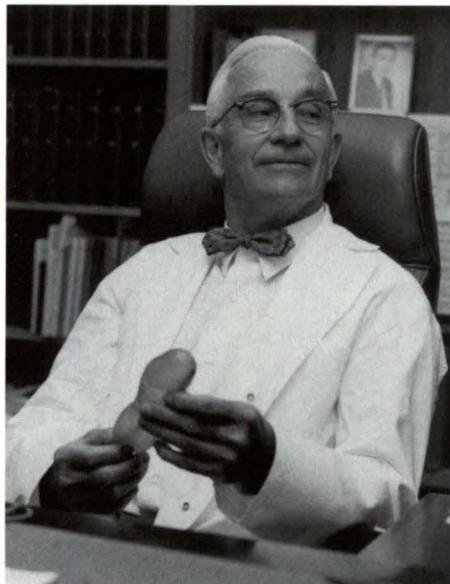
With that start in the heart pacemaker business, Medtronic went on to develop an improved electrode and obtained the rights to an implantable pulse generator. Combined, the two devices became an implantable pacemaker, and Medtronic began production and sales of the devices in 1960. Soon, the market expanded dramatically as Lillehei and others recognized that many sudden cardiac deaths were the result of heart block and could be treated with a pacemaker. Today, the company is a diversified developer and manufacturer of devices for improving cardiovascular and neurological health, with annual sales of \$1.021 billion in 1991 and 8,200 employees.

"There couldn't be a better example of technology transfer and economic development than the University of Minnesota-Medtronic story," Lillehei says. "It turned out to be the beginning of Medical Alley, with all the medical companies (35) that were started later by former Medtronic employees. Earl used to get upset that he was constantly losing good people, and I'd kid him that he was running 'Medtronic University.' "

The Medtronic Foundation continues its partnership with the University through its \$2 million pledge to the Biomedical Engineering Center and the Earl E. Bakken Chair. The center unites the University's medical and engineering faculties with the state's more than 300 medical products companies.

Tiny Bubbles

The cardiac pacemaker turned out to be the most economically lucrative of Lillehei's technology transfer projects, but it was neither the first nor the last. He cites the development of open-heart surgery and the disposable bubble oxygenator that made the operations widely available as a classic case of a medical advance that has stimulated tremendous economic activity, especially in the



Dr. Owen H. Wangensteen, chief of surgery from 1939 to 1967.

accepted beliefs, to say 'Hey, wait a minute, this doesn't look right according to our research,' " Lillehei says. "One of his sayings was 'Tradition is great for the Notre Dame football team or the Cold Stream Guards, but it's a disaster in science,' because it so often represents inherited errors that are taught and passed down to generations of students without question or experimentation."

Wangensteen's own research on the physiology of intestinal obstruction led him to question accepted ideas about its cause, especially post-operatively. He

responded by inventing the Wangensteen Suction Tube, a simple device that syphoned off gas and fluid that often caused fatal obstructions following abdominal surgery. During World War II the device was used extensively for soldiers who had surgery for abdominal wounds and were grouped together in wards called "Wangensteen Alleys."

"Many of us spent time in the Department of Physiology, which was very strong under Maurice Visscher, but you could explore any field, biochemistry, microbiology, even electrical engineering. There was no limit on the field of research; if you had an interest in something Dr. Wangensteen would pick up the phone and arrange for a sojourn in that department. The Surgery Department took care of the salaries for the residents, so the other departments usually were very happy to cooperate," Lillehei says.

Lillehei had his heart set on surgical training with Wangensteen when he left the Army in 1945. The technology of surgery was well established, with good anesthesia and knowledge of blood circulation. But he was struck by the fact that "people were dying of little holes in the heart." As a resident in 1951 he was following a 17-year-old girl with severe cardiac insufficiency, and when she died he remembers being shocked that the cause was a hole between the atria about the size of a 50 cent piece. "It was so

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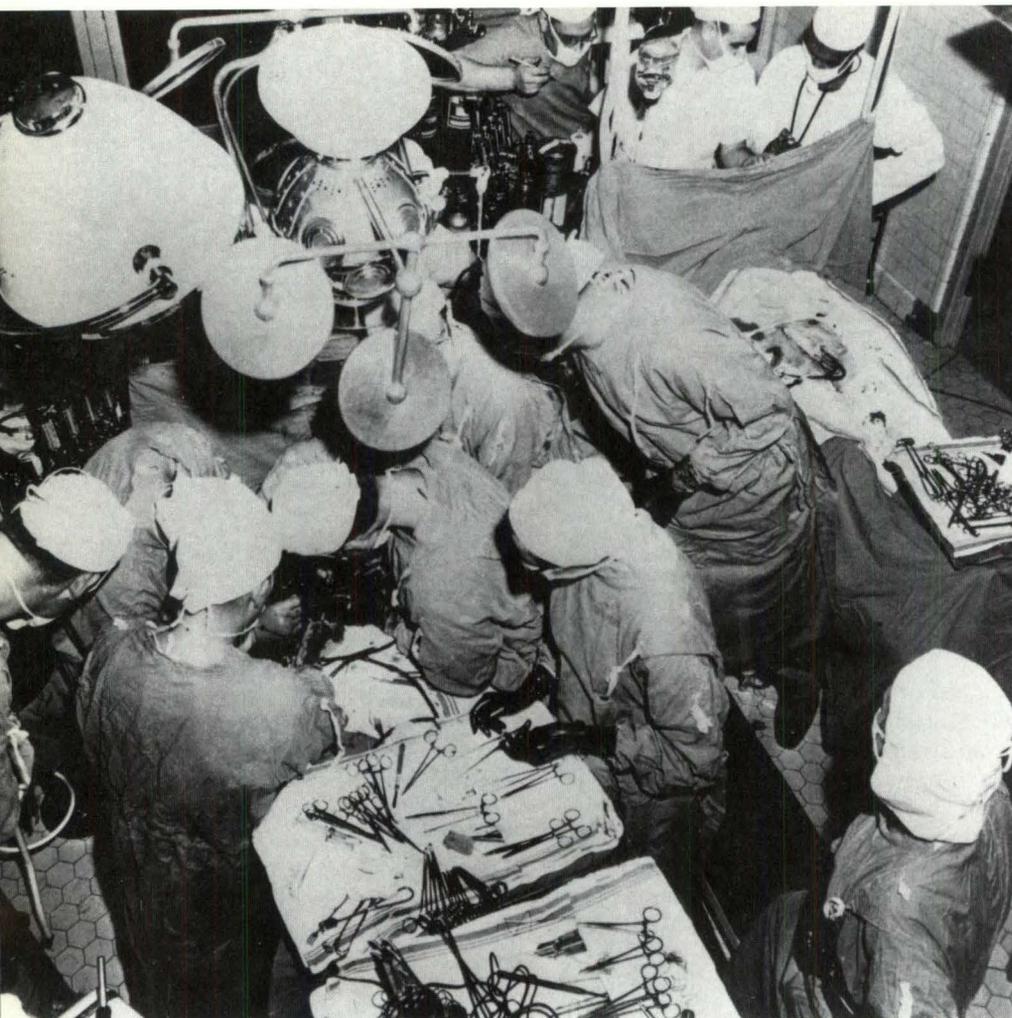
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region where it began. "There are now 2,000 open-heart operations done every 24 hours worldwide," and a much larger proportion are still done in Minnesota because of the many heart surgeons trained at the University or drawn to the state by its medical reputation, Lillehei says.

That reputation was built in the field of surgery through the leadership of Owen H. Wangensteen, chief of the Department of Surgery from 1939 to 1967. The surgical training program under Wangensteen involved rigorous preparation in surgical techniques and post-operative care, but most of all he stressed the importance of innovation based on basic and applied research. "He felt research gave a young surgeon the confidence to question traditional and



Medtronic's first office building and manufacturing facility in Northeast Minneapolis.



Open heart surgery being performed by Dr. C. Walton Lillehei in the 1950s.

tember 2, 1952, saving the life of a five-year-old girl. Over the next two years they used the technique in 11 patients, but they found that it was not suited to most of the birth defects inside the heart because of the limited surgical time available and the risk of ventricular fibrillation due to the cooling.

Lillehei and his residents had a research lab right next to Dennis', and he remembers being as puzzled as Dennis about why the heart-lung device wasn't working. "The pump was no problem, it was when you tried to artificially oxygenate the blood that all kinds of difficulties arose," Lillehei says. "Even when Dennis and others achieved good survival in dogs, the techniques failed in humans. This led to a general pessimism regarding the prospects for open-heart surgery, because it seemed that you could only perform the rigorous bypass techniques on a healthy heart—as in the dog research—but that the sick human heart would never be able to withstand it."

That led Lillehei and residents Morley Cohen and Herbert Warden to conceive the idea of using one dog to perform the oxygenating function for another dog undergoing open-heart surgery. "It was just an experiment, we never thought we would use it in humans, but we were able to obtain 30 minutes of operating time—considered a long time in those days—and the dogs recovered very easily. After we

STIMULATION
TECHNOLOGY

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MEDICAL

easy to repair, if only there could be found a way to empty the heart of blood long enough to do the surgery."

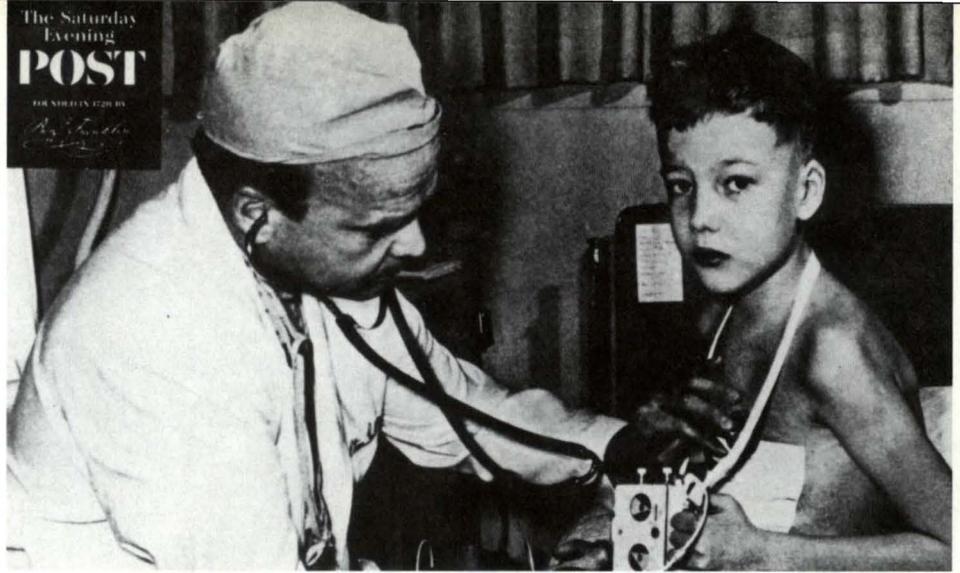
Many engineers and surgeons had attempted to design and build a machine to take over the function of the heart and lungs long enough for a surgeon to make intracardiac repairs. Among them was Clarence Dennis, associate professor of surgery, who in 1945 was asked by Wangensteen to attempt to develop a heart-lung machine. For the next six years he worked in the dog laboratory to try to solve problems such as achieving sufficient oxygenation without blood foaming, and minimizing damage to red blood cells. In 1951, having achieved relatively high survival in dogs, Dennis used his cumbersome device to try to save two young patients, but both died. Later that year, he left for the State University of

New York Downstate Medical Center, taking his heart-lung machines with him. For relinquishing its rights to the Dennis devices, the University of Minnesota received \$16,000, which was used to establish a fund to support heart research by Lillehei and others.

Because of the difficulties Dennis and others were having developing a satisfactory heart-lung machine, surgeons began trying other strategies. One strategy was to cool the patient enough to double the time the brain normally could go without blood, providing surgeons with about seven or eight minutes of operating time in the clamped off heart. The University of Minnesota team of F. John Lewis, Mansur Taufic, and Richard Varco, with Lillehei assisting, used the hypothermia technique to perform the world's first successful open-heart operation on Sep-

had performed the cross-circulation procedure in several hundred dogs with overwhelming success, we presented the findings to Dr. Wangensteen and got approval to try it in children with complex defects who could not withstand the hypothermia treatment. All attempts with the heart-lung machine world-wide had ended in failure, so it made sense to attempt cross-circulation, with a parent providing the pumping and oxygenating functions for the child," Lillehei says.

Their first cross-circulation case in March 1954 was almost cancelled because of fear expressed by some in the Medical School that Lillehei's team was about to achieve 200 percent mortality in one operation. Wangensteen intervened, however, citing the overwhelming success in the dog laboratory as ample justification for going ahead. The procedure



This picture, showing a young cardiac patient holding a wearable external pacemaker of the type invented by Earl E. Bakken of Medtronic, Inc., appeared in the March 4, 1961, issue of the *Saturday Evening Post*. The patient, David Williams, was being examined by Dr. C. Walton Lillehei of the University of Minnesota Medical School who pioneered cardiac pacing and worked with Bakken in development of early pacemakers.

went well in the first patient, a one-year-old boy who had been in the hospital since birth due to heart failure and pneumonia, but he died of recurrent pneumonia 11 days later; at autopsy his defect was found to be completely closed. The second patient, a four-year-old boy, also developed pneumonia but recovered and went home cured of his ventricular septal defect.

Over the next year they performed a total of 45 such operations (with 32 survivors, all with defects that had been considered hopeless up until that time), including nine (with five survivors) for repair of the complex group of disorders presented by tetralogy of Fallot. None of the patient deaths were attributable to the cross-circulation technique and there was no donor mortality but it was still felt that a heart-lung machine would be the eventual answer to oxygenation during open-heart surgery.

"Infants were especially difficult to save, because at that time there were no respirators, no blood gas pH monitors, and no intensive care," Lillehei says. Cross circulation proved that the sick human heart could be successfully corrected, but new technology was needed to make open-heart surgery possible in all advanced medical centers.

The solution would come from another fateful meeting. Richard De

undetected air bubbles getting to the brain. I just told Dick to try to figure out a way to get the bubbles out, and then I gave him suggestions as he built the various models of the device."

A couple months later De Wall and Lillehei had assembled a surprisingly simple blood oxygenator. It relied on a helix of sterilizable plastic tubing that allowed oxygenated blood to release air bubbles and become heavier, settling to the bottom of the helix where bubble-free blood was collected in a reservoir and routed

neering program, Johnson had started a company, Mayon Plastics, which produced plastic tubing for the dairy industry and for production of mayonnaise.

Interestingly, the company's success was partly due to its use of a substance called Antifoam A to coat its tubing and prevent foaming of the liquids being transported. Lillehei recognized that this characteristic would be helpful in preventing foaming of blood, but he was unaware that Antifoam A had originally been used by a group working on a

MINNESOTA
LASER, INC.

VALLEY LAB

SUMMIT MEDICAL
SYSTEMS, INC.

INTERMEDICS

Wall, a recent graduate of the Medical School who was practicing medicine in Anoka, Minnesota, came to see Lillehei one day in 1954 to inquire about a position as a medical researcher. "I didn't really have anything for him to do, but he was very persistent and came back several times just to help out around the lab," Lillehei remembers. "One day we were all scrubbed and ready to do a cross circulation-supported operation but we had no one to run the pump, so I signed up De Wall as a resident, and he ran the pump for us."

Needing an assignment for his new resident, Lillehei presented the problem of designing an effective heart-lung machine. "I didn't tell him about all of the failures, especially the fact that most experts said you couldn't bubble oxygen into the blood because of the danger of

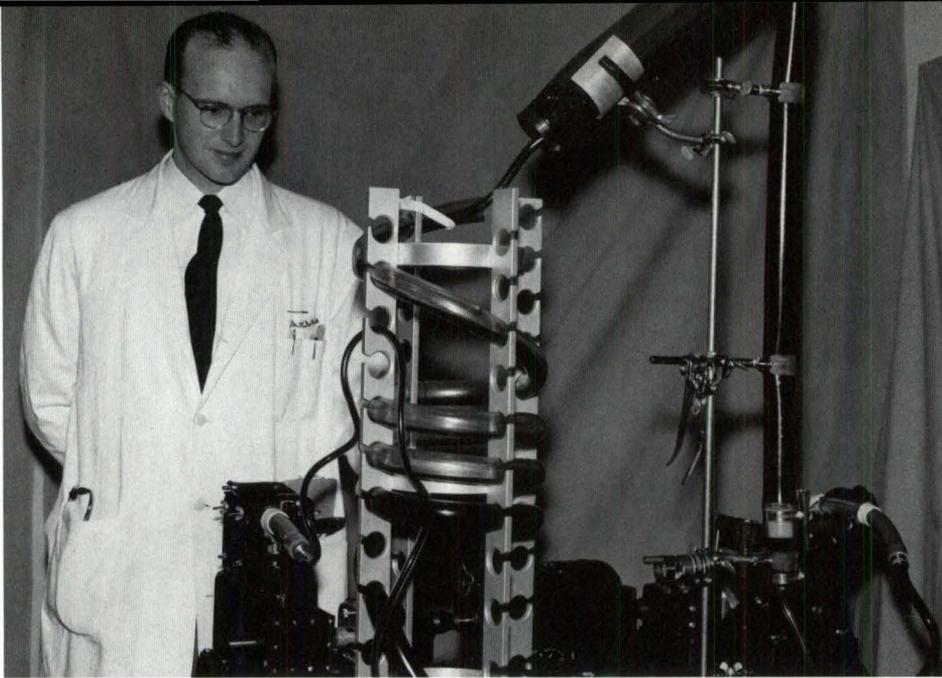
back to the patient. A minimal amount of blood was used, based on unexpected findings in dogs that only about one tenth as much blood as was commonly used was needed to keep patients alive during surgery. De Wall tested the device in about 70 dogs, gradually perfecting it until in May 1955, it was ready to be used in humans.

During construction of the helix design, De Wall told Lillehei that he needed to use tubing that could be bent without breaking or requiring many connections, and could be sterilized by heat. Plastic was the logical answer, but it was scarce in those days of mostly glass and rubber containers. Lillehei found the \$10 of plastic tubing needed for each oxygenator through a high school classmate, Ray Johnson. A 1939 graduate of the University of Minnesota's chemical engi-

bubble oxygenator at Antioch College in Ohio. Mayon Plastics, in Hopkins, Minnesota, still supplies medical companies, thanks to the requests for tubing it began receiving in the 1950s as the De Wall-Lillehei blood oxygenator caught on. Johnson also recently endowed a research professorship in the Department of Chemical Engineering.

Two years after its introduction, the De Wall-Lillehei Bubble Oxygenator had been used in 350 open-heart operations at the University of Minnesota Hospital. De Wall steadily improved the device through three models, but it remained a very simple, disposable, heat-sterilizable device that could be built to accommodate only the amount of blood required for each patient and then discarded.

This was completely different from the other heart-lung machines, which were



Dr. Richard De Wall with the bubble oxygenator he developed for use during heart surgery.

complex and expensive. For example, the Mayo Clinic in Rochester, Minnesota, began an open-heart surgery program in 1955, using a \$500,000 machine built in collaboration with John Gibbon, a pioneer in the field who started with a device designed by IBM engineers. "As heart surgeons came to us and to the Mayo Clinic for training in open-heart techniques, they often were totally confused by the simple versus the complex oxygenator designs," Lillehei laughs. "I always emphasized the need to worship at the altar of simplicity."

In 1956 another one of Lillehei's residents, Vincent Gott, invented a bubble

the staff of the University of Wisconsin, and then was appointed professor and head of the Division of Thoracic and Cardiovascular Surgery at Johns Hopkins University. He is currently president-elect of the Society of Thoracic Surgeons, the largest thoracic and cardiovascular specialty group in America.

Another device, another revolution

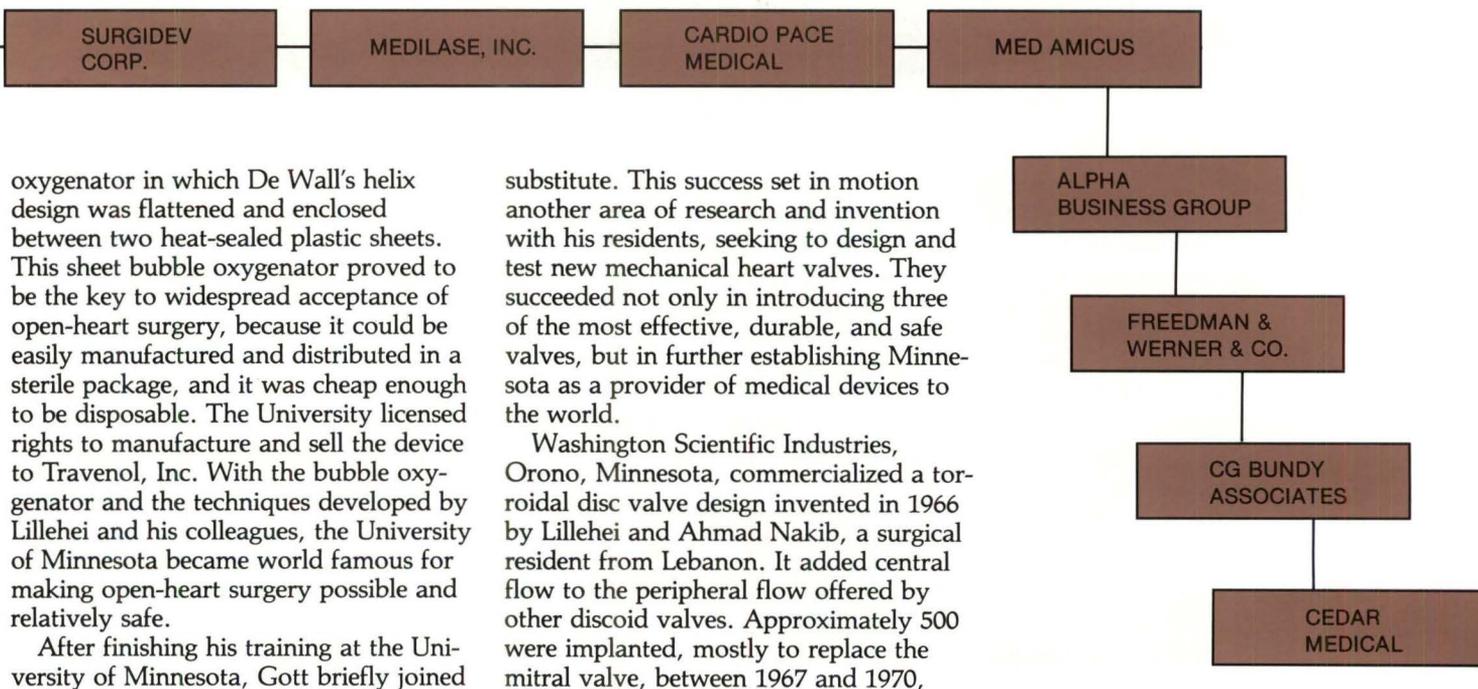
In 1958, Lillehei introduced another revolution to open-heart surgery by performing the world's first replacement of a diseased heart valve with an artificial

and there have been no structural failures reported to the manufacturer.

Another Medical Alley company, Medical Inc., Inver Grove Heights, Minnesota, was started to commercialize a valve designed in 1967 by Lillehei and Robert L. Kaster, a 1962 electrical engineering graduate of the Institute of Technology. The Lillehei-Kaster pivoting disc valve introduced a free-floating carbon disc that opened to 80 degrees. More than 65,000 of the valves have been implanted since 1970, again with no reported structural failures or dysfunction due to wear.

Ironically, the valve design that has turned out to be the world leader was initially rejected by commercial manufacturers. A surgical resident from India, Bhagavant Kalke, in 1965 proposed to Lillehei a design based on two leaflets, hinged at each end to allow them to open and close with the flow of blood. Tests of this design in the laboratory showed the best hydrodynamic performance Lillehei had ever witnessed. However, the first and only patient to receive the Kalke-Lillehei valve died two days after surgery in 1968, although an autopsy was unable to determine the cause of death. Perhaps because of this unexplained death, but more likely because of the radical departure from accepted designs, the inventors were unable to find a commercial manufacturer for the valve.

Eight years later, the Kalke-Lillehei valve was resurrected by a "saint." It was



oxygenator in which De Wall's helix design was flattened and enclosed between two heat-sealed plastic sheets. This sheet bubble oxygenator proved to be the key to widespread acceptance of open-heart surgery, because it could be easily manufactured and distributed in a sterile package, and it was cheap enough to be disposable. The University licensed rights to manufacture and sell the device to Travenol, Inc. With the bubble oxygenator and the techniques developed by Lillehei and his colleagues, the University of Minnesota became world famous for making open-heart surgery possible and relatively safe.

After finishing his training at the University of Minnesota, Gott briefly joined

substitute. This success set in motion another area of research and invention with his residents, seeking to design and test new mechanical heart valves. They succeeded not only in introducing three of the most effective, durable, and safe valves, but in further establishing Minnesota as a provider of medical devices to the world.

Washington Scientific Industries, Orono, Minnesota, commercialized a toroidal disc valve design invented in 1966 by Lillehei and Ahmad Nakib, a surgical resident from Lebanon. It added central flow to the peripheral flow offered by other discoid valves. Approximately 500 were implanted, mostly to replace the mitral valve, between 1967 and 1970,

chosen as the design for a valve to be marketed by a new company called St. Jude Medical, started by another pioneer entrepreneur of Minnesota's Medical Alley, Manual Villafana. A former Medtronic employee who introduced the Medtronic pacemaker into South America, Villafana recognized the value of a long-lasting lithium-powered pacemaker developed by Wilson Greatbatch, inventor of the original implantable pacemaker licensed by Medtronic.

Despite the fact that lithium batteries would last five to 10 times as long as the standard mercury batteries, the lithium-powered pacemaker was rejected by Medtronic and others because lithium was potentially explosive. Convinced by Greatbatch that he had solved this problem, Villafana left Medtronic to start Cardiac Pacemakers, Inc. (CPI). With the help of Lillehei's younger brother Richard, also a pioneering surgeon at the University of Minnesota, the lithium pacemaker was tested and commercialized, and CPI quickly prospered.

Villafana sold CPI to Eli Lilly and Company in 1975 for \$126 million. He then targeted the heart valve industry as being ripe for expansion, and he began working with Lillehei to improve and commercialize the bileaflet valve. "He named the company and the valve after St. Jude, because that's the saint you pray to for a miracle," Lillehei says.

Plenty of miracles have occurred, beginning with the first implantation of the St. Jude Valve in 1977, performed by Dr. Demetre Nicoloff at the University of Minnesota Hospital. Through 1990, more than 320,000 have been implanted, more than any other heart valve in history. St. Jude Medical now has about 46 percent of the worldwide market (80 percent of the heart valves implanted in Japan are manufactured in St. Paul), and 64 percent of the U.S. market for heart valves. St. Jude has diversified into other products such as cardiac assist pumps and vascular grafts, and the company's total sales topped \$175 million in 1990.

Villafana continued his entrepreneurial path by leaving St. Jude in 1981 to found another medical company, GV Medical, and most recently Helix Biocore. Although originally started to provide biotechnology services for the pharma-

ceutical industry, Villafana in 1990 switched Helix Biocore's course to developing and commercializing another version of the bileaflet heart valve.

These days Lillehei is Director of Medical Affairs at St. Jude Medical. He also is a clinical professor of surgery at the University of Minnesota, where his most frequent contacts are with R. Morton "Chip" Bolman III, director of cardiopulmonary surgery and first holder of the C. Walton and Richard C. Lillehei Endowed Chair in Thoracic and Cardiovascular Surgery. The chair was established through the Minnesota Medical Foundation with contributions from the two surgeons' students and friends, who also founded the Lillehei Surgical Society. C. Walton Lillehei trained 139 surgeons from 40 countries at the University of Minnesota from 1951 to 1967, and an additional 28 at Cornell University Medical Center in New York City from 1968 to 1974.

As he looks back over the revolutionary years of the 1950s and 1960s, when both the University of Minnesota surgical program and Minnesota's medical industry achieved status as world leaders, Lillehei remembers a blizzard of activity, both academic and commercial. "There were so many things going on, and we developed so many relationships with local companies that were either introducing new products or supplying the needs of our program—it was good for us and good for them. For example, I remember a fellow named Lew Lehr, who had been hired to start a medical division at 3M. He came over with some samples of tape and we made suggestions about how it could be adapted for hospital use. Then they began making all the linen for the operating rooms and disposable plastic drapes for surgery." Mr. Lehr ended his career as chairman and CEO of 3M, and today medical and surgical products are one of 3M's major divisions.

Lillehei and others, including Medtronic Chairman Emeritus Earl Bakken, see that kind of academic-industrial technology transfer link as ensuring that when a future C. Walton Lillehei has an idea for a medical device, there will be an Earl Bakken nearby to make sure the job is done right. 

Michael P. Moore is communications coordinator for the University of Minnesota's Office of Research and Technology Transfer Administration (ORTTA).

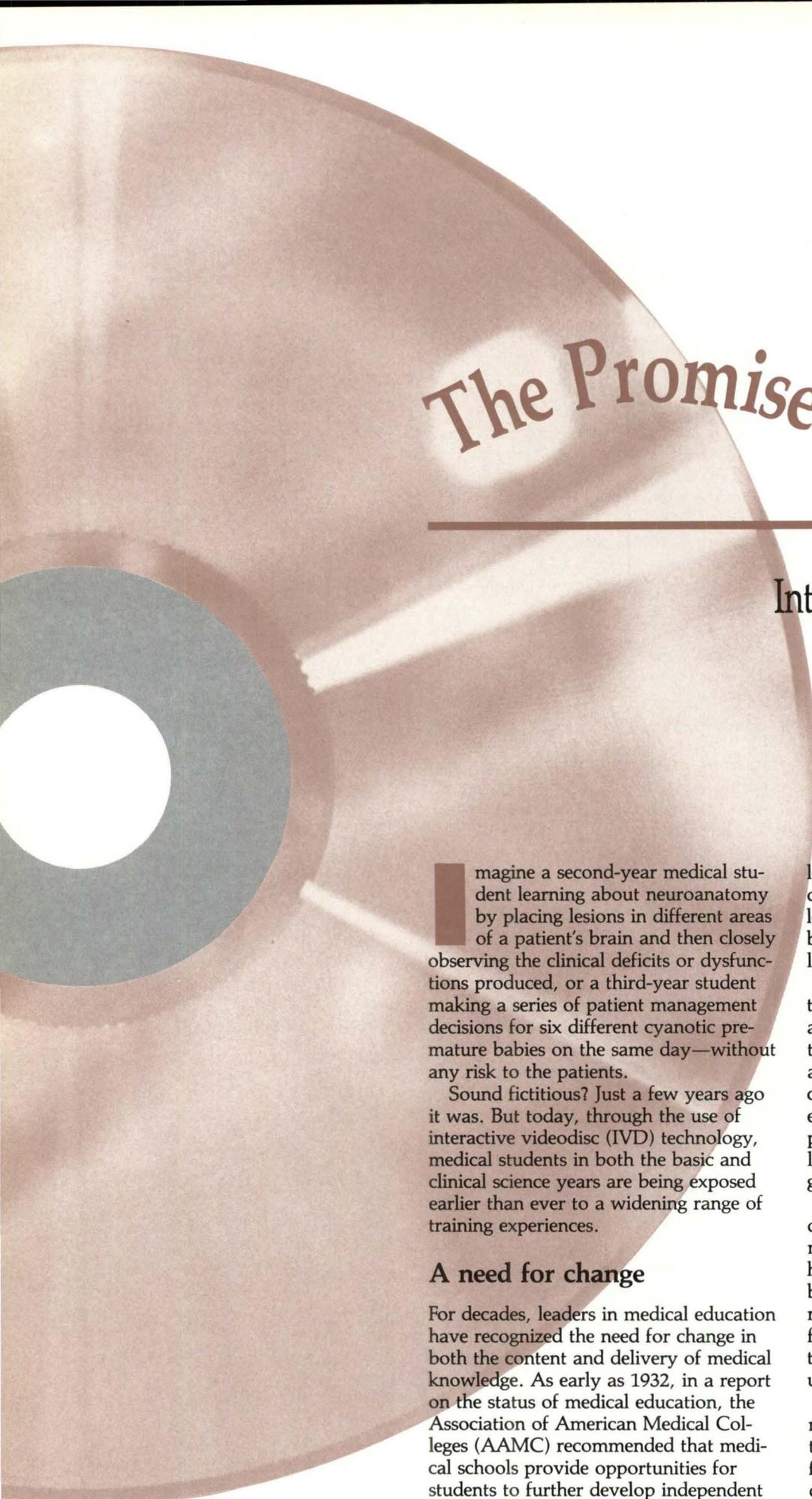
Minnesota Medical Alley Association

The Minnesota Medical Alley Association began about eight years ago to provide support for the economic growth and employment development of Minnesota's health care industry—the fastest growing sector for products and services and the largest employer in Minnesota.

The Association allows all those in medical-related industries to come together to share mutual interests and to speak with one voice on important issues. Its goals encompass legislative issues, product exposure and promotion, management assistance, employment opportunities, international relations, insurance and product liability, medical research, and education.

The mission of the Association goes beyond simply sharing information among members. Its aim is to promote interest and investment in Minnesota as a major center of health care achievement and innovation beyond the state's borders.

One of the goals of the Minnesota Medical Alley Association is to encourage health care educational opportunities and training. In doing so, it has joined with the Minnesota Medical Foundation in creating the Medical Alley Association Scholarship. This \$750 scholarship recognizes a medical student who has demonstrated interest and outstanding competence in the biomedical field. The scholarship was given for the first time in 1991, and the Association is striving to increase its support in this area.



The Promise of IVDs

Interactive videodiscs can mean significant changes in medical education.

by Jean Vileta

Imagine a second-year medical student learning about neuroanatomy by placing lesions in different areas of a patient's brain and then closely observing the clinical deficits or dysfunctions produced, or a third-year student making a series of patient management decisions for six different cyanotic premature babies on the same day—without any risk to the patients.

Sound fictitious? Just a few years ago it was. But today, through the use of interactive videodisc (IVD) technology, medical students in both the basic and clinical science years are being exposed earlier than ever to a widening range of training experiences.

A need for change

For decades, leaders in medical education have recognized the need for change in both the content and delivery of medical knowledge. As early as 1932, in a report on the status of medical education, the Association of American Medical Colleges (AAMC) recommended that medical schools provide opportunities for students to further develop independent

learning skills, and in addition should consider major reductions in passive learning strategies and require students to be active, independent learners and problem solvers.

Again in 1984, the AAMC reiterated these earlier recommendations, and added yet another critical recommendation: medical schools should lead in the application of information science and computer technology and promote their effective use. As medical education prepares to enter the 21st century, it is this later recommendation that provides the greatest opportunity for change.

In the near future, developments in data storage and retrieval applications to medical education that could not even have been imagined five years ago will be available. Even today, computer technology has the power and capacity to facilitate independent learning and to teach problem solving in a manner unmatched by any other medium.

While lecturing and other traditional modes of delivery are expected to remain the preferred and most widely used forms of instruction, interactive videodiscs are assuming an increasing role in

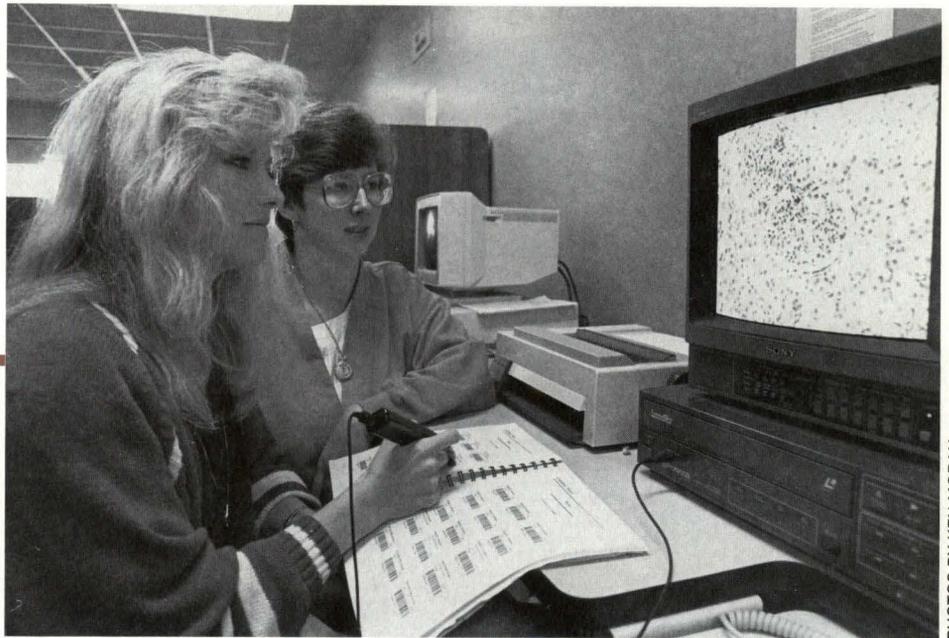
supporting these methods. Microscope setups and cadaver dissection, for example, are both time-consuming and expensive, and textbooks do not meet the need for realistic representations. But through the combined features of videodisc player, high-resolution monitor, and the user-controllable personal computer, students can have unrestricted access to such things as three-dimensional models in anatomical detail.

Unlike television, once touted as a new medium with the capacity to transform education, computer-controlled videodisc technology is intrinsically interactive. Once engaged, interactive videodisc systems respond almost instantaneously to users' commands with a multiplicity of visual, auditory, and text-based messages.

Combining resources

Every learning resources mode, whether it be textbooks, workbooks, slides, filmstrips, films, videotapes, television, or even traditional computer-based instruction, has some inherent weakness. Today's IVD technology can overcome these inherent weaknesses because it is capable of combining all of these resources into one format.

Flexible enough to incorporate emerging technologies such as Compact Disc-Read Only Memory (CD-ROM), Digital Video Interactive (DVI), Compact Disc Interactive (CDI), and Artificial Intelligence (AI) without making initial hardware investments obsolete, IVD systems harness the branching power of the computer with the vast storage capacity of the optical disc.



UMD medical students Marie Casey Byron and Deb Nyquist Culver study medicine by incorporating the IVD program.

PHOTOS BY KEN MORAN

Given the level of current technology, even the concept of adaptive testing—a process that can be administered only by computer—is now possible. Because successive questions asked are a function of previous answers, a precise level of knowledge can be quickly and accurately measured. Prescriptively, adaptive testing can be used to profile the student's level of knowledge and provide references for further study contained on the same disc.

The key to the application of the system to medical education is the videodisc. The silver-colored, 12-inch rigid circular disc can store still or moving images, audio sounds, and digital data. Continuous Angular Velocity discs used in interactive programs store up to 30 minutes of video on a side, and allow users to randomly access individual frames or still pictures.

In this format, information is stored in 54,000 circular tracks etched onto the disc, forming a spiral pattern that runs from the inside of the disc to the outside edge. Each track contains thousands of small microscopic indentations or "pits" etched 0.043 inches beneath the transparent acrylic surface. These pits constitute the electronic audio/video information. As the disc spins at a speed of 1,800

rpm, a microfine laser beam scans across the surface reflecting back the two channels of audio and one channel of video information. And videodiscs last virtually forever. Since there is no direct contact between the software and the playback device, the discs can be played repeatedly without any loss of fidelity.

UMD's innovative programs

Many of the exciting examples of IVD were developed specifically for medical education. During the last several years, two IVD programs have been developed at the University of Minnesota's School of Medicine in Duluth. Stephen W. Downing, Ph.D., associate professor of biomedical anatomy, and Patrick C.J. Ward, M.D., professor and head of pathology and laboratory medicine, have each produced comprehensive and thorough IVD programs that augment and/or provide a means to teach, learn, or review subjects in their respective fields of medicine.

The IVD program *Histology: A Photographic Atlas* created by Downing, and Ward's *The Urinary Sediment (Videodisc Atlas)* as well as his *Computer Interactive Program in Hematology: Part I*.

Pathology of the Blood IVD program, due to be published this fall, represent innovative educational and training instruments at the School.

Downing's IVD program provides students and teachers of histology with an extensive readily accessible library of color photographs of cells, tissues, and organs as they would appear through a microscope. The images stored on the videodisc are primarily on mammalian histology, with occasional examples of non-mammalian tissues and organs and some plant material.

Most of the original images on Downing's IVD program appear on the videodisc three times in three successive

accompanying manual for Ward's *Diagnostic Hematology: Part I* consists of 150 chapters on diseases diagnosable in peripheral smears, with modules on morphology, laboratory tests, cytochemistry, cytogenetics/inheritance patterns, immunology, molecular biology/pathophysiology, and a current bibliography. The videodisc itself contains approximately 8,600 frames, with an estimated 20,000 illustrations, of blood and organs involved by the disease process.

While the School of Medicine has made a significant investment in IVD development and incorporation into the curriculum, virtually all medical schools now employ some form of computer-

might not otherwise see. Given the widespread policy of low-bed occupancy and brief hospital stays, students in clerkships today may not have the opportunity to manage illnesses that once resulted in hospital admissions.

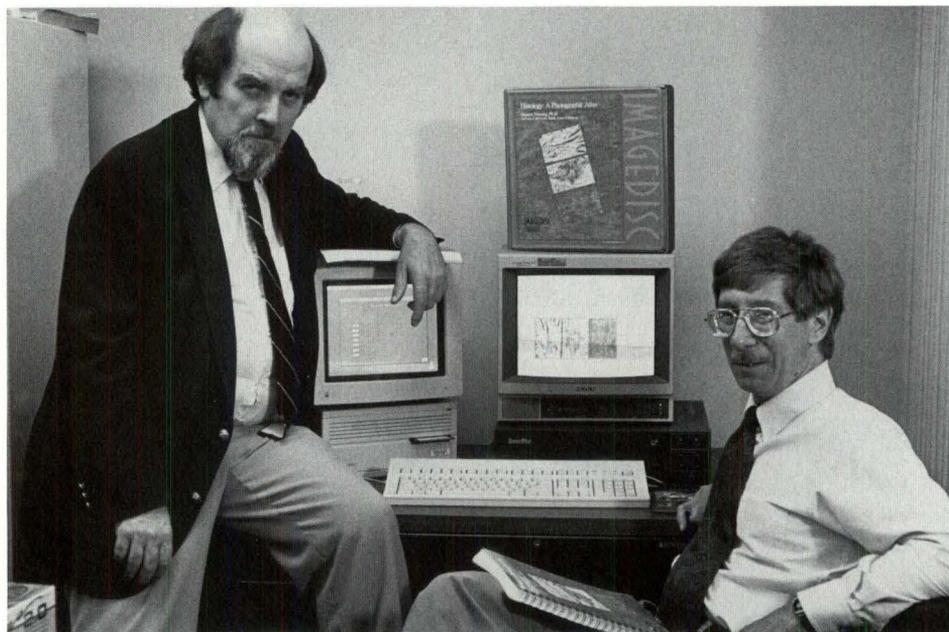
Good simulations have the capacity to interrupt and prompt the learner toward preferred courses of action, and virtually all of them provide feedback—either in the form of tutorials or references to guide further learning. Programs can be used to assess competence, to track and record performance, and to provide confidential evaluations.

Although only a few studies have been done in medical education, the effectiveness of CAI in other fields has repeatedly been demonstrated. Well-designed interactive programs have been shown to result in significant increments of knowledge per unit time. Following exposure to simulations, diagnostic accuracy in the management of ailments such as urinary tract infection and sore throat have been shown. And positive changes in the behavior of practicing physicians in caring for patients have also been demonstrated.

While computer-assisted instruction has been shown to reduce the time necessary to complete a course of instruction by 33 to 67 percent and virtually ensure mastery level performance, medical educators at the School of Medicine and elsewhere are asking whether the development of IVD is cost-effective. So far, the answer is "maybe." Although the cost per instructional hour is inversely proportional to the number of users, if the use of IVD is to be cost effective, a major faculty commitment to incorporating such programs into the curriculum is necessary.

Though the future of IVD and other forms of computer assisted learning in medical education is still uncertain, one thing is clear: it is simply no longer possible to infuse all of the biomedical knowledge available into students, whether at the graduate or postgraduate level.

As science information continues to increase at the rate of 13 percent each year and the scientific database doubles every 5.5 years, problem solving and decision analysis on the part of the medical students, researchers, and practitioners will grow more critical. Indeed, if medical education continues to depend upon traditional forms of learning and instruction, it will be at the expense of cogent patient care.



Drs. Patrick Ward (left) and Stephen Downing have produced comprehensive IVD programs for use in medical education.

frames. Because the level of information in a typical three-frame sequence varies from image alone, to image with indicator, to image with indicator and text identifying the source of the tissue, considerable latitude exists in how the videodisc can be used.

Downing's videodisc, accompanied by a 244-page barcode manual for rapid retrieval of a single image, contains more than 7,000 original images and over 21,000 total images arranged in a chronology that resembles the typical sequence followed in a histology course.

Ward's first IVD program contains formed elements in the urine of patients with urinary tract disease. The photolibrary consists of some 1,700 prime photomicrographs of urinary sediment. The

assisted instruction (CAI), according to the AAMC. And students are demanding more.

In a 1986 survey of graduating medical students, no other issue received such a high rate of response. The results revealed that students universally wished they had more instruction by computer, as well as more teaching about computer applications in medicine—the area in which CAI shows the most promise.

Most of the IVD programs available today are in the simulation mode. Such programs allow medical students and physicians to diagnose and manage patient problems, permitting errors in reasoning and judgment. Simulations allow them to become familiar with the spectrum of symptoms and illnesses they

A Third World Education



*University medical student
experiences the practice of medicine
in a remote area of Thailand.*

by David R. Johnson, M.D.

Editor's note: Dr. Johnson received a Medical Student International Study Fellowship from the Minnesota Medical Foundation. The fellowships were established by Drs. Sarah J. and N.L. Gault, Jr., to enable medical students to enrich their education through international clinical experiences.

arrived in Thoed Thai, the town where Tom Dooley Heritage's 10-bed hospital is located, just before the start of the rainy season. After traveling 16 hours by bus from Bangkok, I rode in the back of a pick-up truck up the winding roads into the 3,000- to 5,000-foot opium hills of Northern Thailand. At a fork in the road about 15 kilometers up was an Akka village, one of the numerous hill-tribe villages scattered throughout this mountain range. To the left on a rare paved road another 13 kilometers up the mountain crest was Mae Salong.

This town had a distinctly Chinese flavor, as it was founded by former military personnel from Chiang Kaishek's 97th Regiment. In the past they had financed their destabilization raids into Communist China through profits from

the opium trade. To the right at this Akka village, down 13 kilometers of ruddy washed-out cliff-edged dirt road, was Thoed Thai.

Although I spent two years in Thailand with the Peace Corps, life in Thoed Thai was a surprise and maybe even a shock. It is like nowhere else that I have been in the world. It is a pitiful, isolated island-town whose inhabitants have little hope but to remain trapped by the political situations surrounding them. Many have fled from the fighting in Burma, yet they are not allowed to become Thai citizens or even to travel down to the lowlands for fear of being jailed by Thai police as illegal aliens.

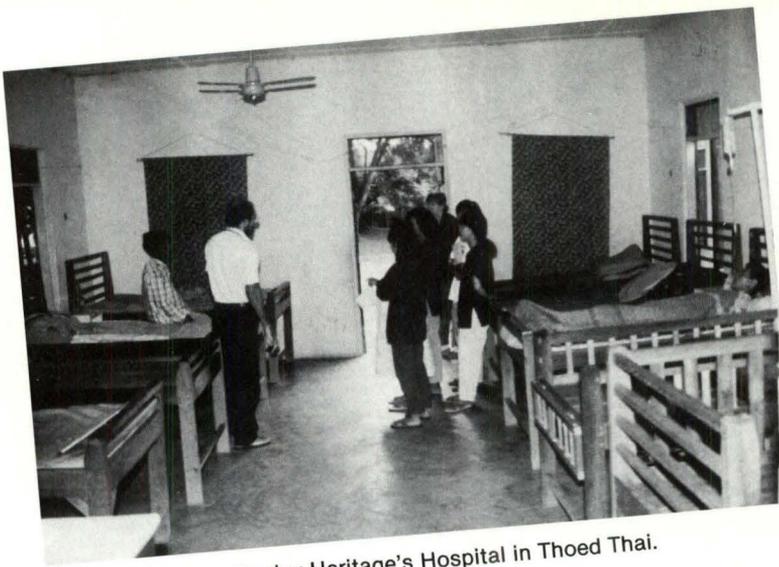
The town and surrounding area support a varied population mix of Southern Chinese, Shan lowlanders from Northern

Burma, and a number of culturally and linguistically distinct hill-tribe groups of Tibeto-Burman and Mon-Khmer origin including Hmong, Akka, Lisu, Lahu, and Mien. It was especially strange for me to live in a town in Thailand where few persons even understood the Thai language.

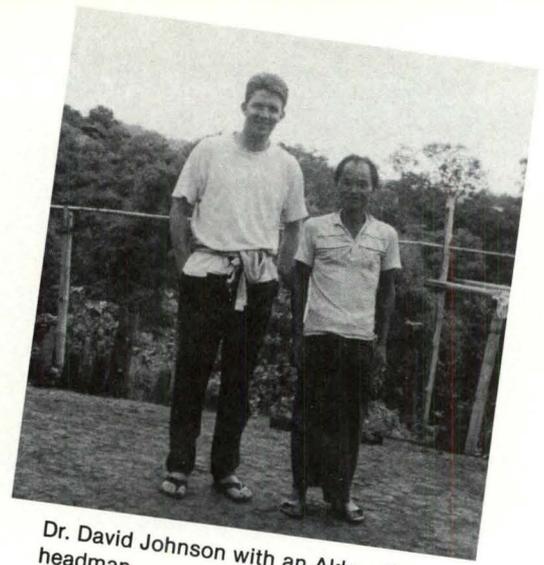
A day at the hospital

The hospital is currently run by Dr. Joseph Flear, an American who had his pediatrics training at Georgetown and has worked for the last five years with the United States Public Health Service in Yap, Micronesia. He had also been a Peace Corps volunteer in Thailand's malaria control program before medical school.

The hospital's staff included a Burmese



Tom Dooley Heritage's Hospital in Thoe Thai.



Dr. David Johnson with an Akka village headman.

nurse, two Lahu nurses, two Northern Thai nurses, and six "medics" of various hill-tribe ethnicity who served as translators and performed routine medical duties. There was also a Chinese pharmacist and a Chinese lab technician.

The lab technician performed simple tests such as a CBC with differential, hemoglobin, malaria smears, AFB sputum preps, urine analysis, and stool examinations. The hospital also employed two public health field work nurses who travelled by foot to distant villages when the political situation was stable. They provided health education, immunizations, and supplies for a network of village health volunteers and their respective villages.

A typical day at the hospital began with tea and oranges on the back porch of our cement barracks. Dr. Flear always had some interesting medical stories, speculation on the area's political situation, or comments on the genesis of distant low rumbling sounds which we had heard over the night. Inpatient rounds began at 8:00 a.m., and were always full of surprises.

No matter what the ailment, it seemed exceedingly difficult to convince a patient to stay for more than two or three days. Their expectations for Western medicine

demanded wonder drugs (usually intravenously). If there was not a prompt cure, countless time-tested spirit ceremonies were already being delayed, angering the offended spirits. Additionally, these hill-tribe people were continuously living on a narrow margin of existence. They usually could not afford to lack an extra body in their fields during planting, weeding, or harvest.

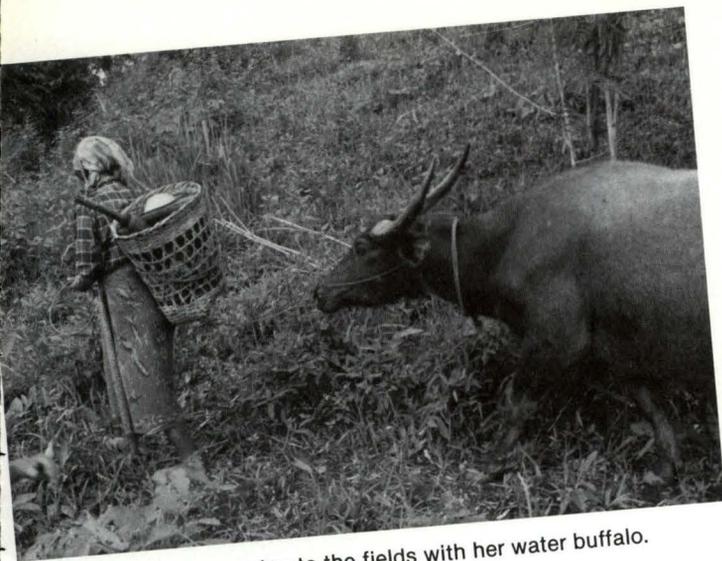
Following rounds I would work in the outpatient dispensary seeing patients. At first I was assisted by Dr. Flear, then as I grew more comfortable I ran the clinic with a nurse. The variety and breadth of disease I observed was extensive, though frequently we would be unable to confirm our suspicions. We had inadequate diagnostic tests and therefore relied almost exclusively on clinical findings. When patients were referred to secondary or tertiary care centers in the lowlands, follow-up was unfortunately abysmal.

Common diseases seen at the clinic included dengue fever, amoebic dysentery, falciparum and vivax malaria, pyomyositis, pneumonia, scrub typhus, gastroenteritis, active tuberculosis, opium addiction, typhoid fever, hook-

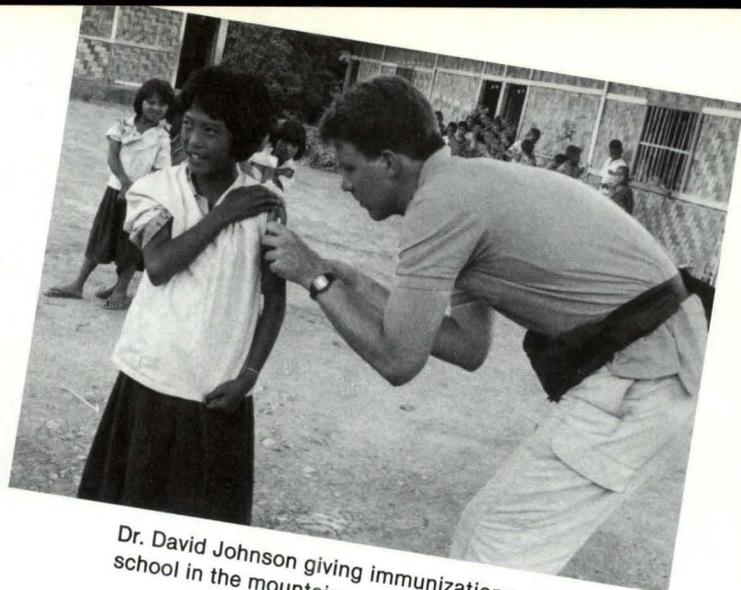
worm, pin worm, iodine deficiency with goiter, ingrown toe nails with granulomatous foreign body reactions, boils, conjunctivitis, and mild to moderate malnutrition.

Less common cases included glomerulonephritis, marasmus, kwashiorkor, dengue hemorrhagic fever, thiamine deficiency, leprosy, rheumatic carditis, serous cystadenoma, appendicitis, Japanese B encephalitis, wet beri beri, cerebral malaria, amnionitis, septic abortion, neonatal tetanus, and a birth anomaly for which I am unable to find a recognizable syndrome (anencephaly, bilaterally large kidneys-renal mass, meningomyelocele, asexual genitalia, tongue tags, and six digits on all four extremities).

One very sad case concerned a young Shan child who died shortly after being brought in to see us. This five-year-old boy had reportedly been sick with a cough and fever for one week before visiting our clinic. It is common practice for many of the people in that area to go directly to the local "healer" with prescription medicine of their choice, and he will inject their medicine whatever it may be. In Thailand there is really no such thing as prescription drugs since all medicines can be purchased by anyone at anytime. From what we could deduce, this unfortunate young boy's parents bought a methyl salicylate compound which was put into solution and injected directly into his vein causing his death.



Lahu woman going to the fields with her water buffalo.



Dr. David Johnson giving immunizations at a school in the mountains.

Another interesting case, which on follow-up turned out to be a serious cystadenoma—once the 30-year-old Akka female returned from the lowland district hospital—physically presented to us in a most unusual way. Our clinic was abruptly disrupted around noon by a loud group of Akka men clustered in front of the hospital. There were approximately 10 men surrounding two other men who had just set down a woman who was lying in a make-shift 10-foot-long bamboo stretcher. They had been carrying her over steep mountainous trails for five hours to reach our hospital. On examination the woman had a very tense, enormous abdomen. It seems she had been brought in due to protracted vomiting and weakness. They were convinced she was pregnant, though realized something wasn't quite right.

A learning experience

I've acquired multiple anecdotes and information during my history-taking regarding cultural healing techniques. These vary from spirit placating ceremonies to physical techniques such as "coining"—rubbing a coin edge abrasively on the neck and upper back as a means to relieve fevers. Use of these healing methods was quite prevalent and apparently very effective. Often patients were only brought in to see us after a sufficient trial using these local

curative procedures had failed.

During my stay in Thoed Thai I accompanied public health workers on a three-day outing to distant villages. We hiked a full eight-hour day, wading through streams and climbing steep muddy jungle trails to reach our first village. Once at the village we would re-supply the village health volunteer and then set up for immunization administration to children at the local schools.

We would stay overnight at the village headman's house. Dinner always tasted extra good after a strenuous day, especially when accompanied by generous amounts of throat-charring rice whiskey to wash things down. I was usually the center of attention for these villagers, most of whom had never seen a tall Caucasian man. Administering immunizations in these remote areas was generally quite problematic due to inadequate records, lack of proper refrigeration, and inaccurate timing of scheduled secondary immunizations due to the area's remoteness.

Through my clinical work at Tom Dooley Heritage's Highland Health Center, I experienced first-hand the provision of health care in a rural Third World setting. It provided for me a stark contrast to what I had previously experi-

enced in our American teaching hospitals. This was not only true regarding the scope of disease I encountered, but also, and perhaps more importantly, it was true of the significantly different methods used and outcomes anticipated in such a medical practice.

I found it very exciting, yet frustrating, to be bombarded with potentially urgent and fascinating diseases without any real means to provide much more than antibiotics, antimalarials, antitubercular medicine, and a little compassion. In addition, it was difficult to frequently lack the relative certainty of confirmatory tests for diagnosis.

Strangely, despite a lack of many successful tangible outcomes, I found my patient encounters to be especially rewarding. Maybe this was due to their differing expectations for medical care from what I was used to, or maybe this could be attributed to my special interest in the various "folk" remedies related. It was unclear to me. However, the experience answered an important question for me. It gave me confidence that I would indeed be enriched and satisfied by a medical experience such as this during some period in my future.

MEDICAL SCHOOL NEWSBRIEFS

Medical School News

Dr. Robert E. Anderson has been named vice president for health sciences. Dr. Anderson previously served as professor and head of pathology at the University of New Mexico School of Medicine. The associate editor of *Human Pathology* since 1972, he is also a member of the editorial board of *Archives of Pathology and Laboratory Medicine*.



• • •

The bone marrow transplantation program has received a five-year, \$13 million grant from the National Cancer Institute (NCI). The funding supports the program's diverse research activities, which are led by **Dr. John Kersey**, professor and program director. In approving the grant, the NCI gave the program the best score it has ever given a medical center seeking a bone marrow transplantation project grant.



• • •

The University of Minnesota will participate in a multicenter clinical trial in kidney transplantation. Funded by the National Institute of Allergy and Infectious Diseases (NIAID), the project will evaluate immunosuppressive agents in the prevention and control of kidney transplant rejection. With \$2 million for the first year of a four-year study, investigators at eight centers hope to find ways to increase the long-term survival of kidney transplant recipients. **Dr. Arthur Matas**, associate professor of surgery, received the award at Minnesota.

• • •

Further funding of a \$1 million biomedical scientist exchange program between the University of Minnesota Medical School and the Karolinska Institute of Stockholm, Sweden, initiated by Curtis L. Carlson, chairman of Carlson Companies, Inc. and president of the Curtis L. Carlson Foundation, was announced October 25 by Carlson and Dr. David

M. Brown, dean of the University's Medical School.

Carlson, who provided major funding to endow the exchange, made the announcement at a meeting of the Royal Round Table of the Swedish Council of America. Carlson and University officials recently completed negotiations with David Ottoson, executive director of the Wenner-Gren Center Foundation of Stockholm, to fund the Wenner-Gren Visiting Professorship at the University of Minnesota. Wenner-Gren, a prominent Swedish scientific research foundation, will sponsor the sending of a Karolinska scholar to Minnesota each year.



Carlson Companies Chair Curt Carlson and Medical School Dean David M. Brown, M.D.

Plans for the exchange between the University and Karolinska, Sweden's only higher education institution specializing in the training of health care professionals and home of a number of Nobel laureates in medicine, were developed beginning in 1988. At that time, Carlson and the University's Permanent University Fund contributed \$1 million to help establish the program. Since that time, plans have been in progress to establish a Swedish source of support for the exchange.

Dr. Robert Elde, professor of cell biology and neuroanatomy at the University, was the first Minnesota scholar to go to Karolinska. Elde, who currently is in Sweden at the institute, is investigating the chemical mechanisms behind bone pain. His work concerns infections and injuries of bones, along with bone cancer. It is hoped that



his research into what causes such pain will someday lead to better methods of treatment.

Cell Biology and Neuroanatomy

Dr. Richard Linck received a \$1,431,320 grant from the National Science Foundation to establish a research training group in cytoskeleton biology, which focuses on the supportive components within cell cytoplasm. Minnesota was one of 10 universities to receive awards for new projects to train students in rapidly advancing research areas requiring multidisciplinary participation.

Dermatology

Dr. Mark Dahl was voted president-elect of the American Academy of Dermatology. **Dr. Peter Lynch** moved from vice president-elect to vice president of the American Academy of Dermatology.

Family Practice and Community Health

Dr. John E. Verby received the American Academy of Family Physicians' Thomas W. Johnson Award which recognizes persons who have made exceptional contributions to family practice education, and undergraduate, graduate, and continuing education spheres.

Medicine

Joining the Department of Medicine are: **Drs. David H. Ingbar**, associate professor of pulmonary diseases, **Thomas Johnson**, assistant professor of medicine, and **Keith Lurie**, assistant professor of cardiology. Joining the Oncology Division as assistant professors are **Drs. James Glaubner** and **James Radford**.

Dr. Thomas F. Ferris, professor and chairman of the Department of Medicine, was elected for a three-year term to the Advisory Council of the National Institutes of Diabetes, Digestive and Kidney Diseases. Elected to the American Society of Clinical Investigation were **Drs. Gordon D. Ginder**, professor of medicine and director of medical oncology, **Philip B. McGlave**, professor of medicine and director of the Adult Bone Marrow Pro-

gram, and **Clifford J. Steer**, professor of medicine, Division of Gastroenterology. **Dr. Bruce Peterson**, professor of medical oncology, was elected president of the Minnesota Division of the American Cancer Society. **Dr. B.J. Kennedy**, Regents' Professor of Medicine and Masonic Professor of Oncology, was elected Honorary Life Member of the Minnesota Division of the American Cancer Society board of directors.

Microbiology

Dr. Russell Johnson received a \$350,122 National Institutes of Health award for his project entitled, "In vitro and in vivo antimicrobial studies on *B. burgdorferi*." He was also elected chairman of the Fifth International Conference on Lyme Borreliosis in Arlington, Virginia. **Dr. Ron Jemmerson** received a grant of \$150,000 from the Council for Tobacco Research for his project "Molecular basis for antigenicity." **Dr. Martin Dworkin** was named a Sackler Fellow at Tel Aviv University.



Neurosurgery

Dr. Timothy J. Ebner was promoted to professor of neurosurgery and physiology. **Dr. Richard E. Latchaw**, professor of radiology and neuroanatomy, was recently appointed to director of neuro-radiology.

The Department of Neurosurgery received a joint National Institutes of Health grant to study head injuries. The project, headed by **Dr. Gaylan Rockswold**, associate professor of neurosurgery, will center at Hennepin County Medical Center. **Dr. Edward L. Seljeskog** was elected secretary of the American Board of Neurologic Surgery. He also serves on the American College of Surgeons board of regents.

Ophthalmology

Dr. Mark Balles joined the faculty September 1 as assistant professor in the vitreoretinal surgery and disease division.

Orthopaedic Surgery

Joining the department as assistant professors are **Drs. Denis R. Clohisy** and **Kirkham B. Wood**. **Dr. Elizabeth Arendt**

received a 3M non-tenured faculty grant to study the effect of load on autograft tendon. She also was elected to the NCAA Committee on Competitive and Medical Safeguards.

Otolaryngology

Dr. David B. Hom received the 1991 National Percy Memorial Research Award from the American Academy of Otolaryngology-Head and Neck Surgery. The award includes a one-year grant for his project, "Vascular Effects of Sustained Fibroblast Growth Factor." **Dr. Frederic E. Levy** was the recipient of the 1991 Ben Shuster Award, presented by the American Academy of Facial Plastic and Reconstructive Surgery. The award is presented for the most outstanding research paper by a resident or fellow on any clinical or research work in facial plastic and reconstructive surgery.

Pediatrics

Dr. Peter Blasco was appointed associate professor of adolescent medicine.

Drs. Harumi Jyonouchi, immunology, **Peter Jespasiano**, critical care, and **John Wagner**, bone marrow transplant division, were all recently named assistant professors.

Dr. Robert Blum, director of the Adolescent Health Training Program, was elected president of the Society for Adolescent Medicine for 1991-92. **Dr. James Moller** was elected to the executive board of the American Academy of Pediatrics, and **Dr. Mark Nesbit** was elected president of the International Society of Pediatric Oncology. The 1991 MMF Outstanding Medical School Teaching Award was presented to **Dr. Robert Vernier**.

Drs. William Krivit and **Elsa Shapiro** received a five-year \$1.45 million grant from the National Institutes of Health and National Institute of Neurological Disorders and Stroke. They will conduct a national control study of the value of bone marrow transplant for seven storage diseases.

Physiology

Dr. Martha Flanders has joined the department as assistant professor, and **Dr. Jurgen Fohlmeister** was promoted to associate professor. **Dr. Apostolos Georgopoulos** was appointed professor of physiology and holder of the Brain

Sciences Chair at the VA Medical Center.

Dr. Dale Branton was the recipient of a National Institutes of Health award entitled, "A Study of Potent CA Channel Blockers from Spider Venom." **Dr. Apostolos Georgopoulos** was awarded a National Institutes of Health Javits Award for his project, "Neurophysiology of Cognitive Processes in Motor Behavior." **Dr. Richard Purple** received an MMF award for his project entitled "Long Term Perfusion Studies of the Isolated Eye," and **Dr. John Soechting** received a National Science Foundation award for his project on "Motor Control of Bimanual Movement Sequences." **Dr. Lisa Carney** was the recipient of the I.J. Fox Award. **Dr. Liming Shen** was awarded the Bacaner Award, and recently presented with the Hemingway Award was **Dr. Wallace Thoreson**.

Surgery

Dr. Joseph E. Murray was the Fifth Owen H. Wangenstein Visiting Professor in Surgery in October. **Dr. Murray** performed the first successful human organ transplant in 1954, using a kidney donated by the patient's twin brother.

Therapeutic Radiology

Dr. Seymour Levitt, professor and head of Therapeutic Radiology, received the 1991 Gold Medal Award from the American Society for Therapeutic Radiology and Oncology. The highest honor presented by the society, the award recognizes **Dr. Levitt's** international contributions to society and the specialty.

UMD School of Medicine

A Center of Excellence in American Indian Medical Education has been established at the University. Funded with a \$700,000 grant from the U.S. Department of Health and Human Services Division of Disadvantaged Assistance, the multicampus program will do three things: recruit and support successful American Indian college students, provide a curriculum that includes Indian health education, and carry out research projects relevant to American Indian health care. The effort, under the direction of **Dr. Gerald Hill**, will be coordinated through the University of Minnesota-Duluth School of Medicine.

MMF REPORT

MMF approves \$166,251 in research grants

The Minnesota Medical Foundation board of trustees approved \$166,251 in research and special grants at its summer quarterly meeting. The amount includes \$70,651 in faculty research grants, \$39,600 in student research grants, and \$56,000 in special grants for research equipment and salary support.

Faculty grants include: **Susan Berry, M.D.**, Pediatrics, \$5,000, Evaluation of growth hormone regulation of Spi 2.1 gene expression in transgenic mice; **Joyce Chung, M.D.**, Psychiatry, \$4,000, Psychiatric disorders in an ambulatory HIV population—prevalence, mental health service utilization, and health status; **Anil Dhuna, M.D.**, Neurology, \$5,130, Functional anatomy of chronic cocaine-induced hyperactivity, stereotype, and seizures; **John Eaton, Ph.D.**, Lab Medicine and Pathology, \$5,000, Redox reactions of ocular ascorbic acid; **Michael Glock, M.D.**, Pediatrics, \$3,500, Pathogenesis of bile duct injury; **John Hitt, M.D.**, Medicine, \$4,000, Identification of *Toxoplasma gondii* using DNA amplification; **Virginia Kubic, M.D., Ph.D.**, Lab Medicine and Pathology, \$7,000, Application of hematopoietic growth factors and use of in situ hybridization; **Steven McLoon, Ph.D.**, Cell Biology and Neuroanatomy, \$5,000, Cell determination in developing retina; **Claire Pomeroy, M.D.**, Medicine, \$5,000, Transmission of murine cytomegalovirus infection by transfer of latently infected splenic stromal cells; **Sarah Schwarzenberg, M.D.**, Pediatrics, \$5,000, Characterization of a serine protease inhibitor regulated by development; **Sara Shumway, M.D.**, Surgery, \$7,500, Novel method for noninvasive detection of rejection in heart transplant recipients; **Edward Stauffer, Ph.D.**, Physiology, \$3,021, Matching funds to purchase a precision micromanipulator; **Clifford Steer, M.D.**, Medicine, \$4,500, Cloning, sequencing and characterization of the retinoblastoma gene in rat—potential regulatory role in liver regeneration; **John Winkelmann, M.D.**, Medicine, \$4,000, Human erythropoietin receptor; and **Gang Zhang, M.D.**, Urologic Surgery, \$3,000, Intravesical instillation of mucobioadhesive polymers for treatment of interstitial cystitis and

Continued on page 23

MMF Grant Recipient: Dr. John W. Eaton

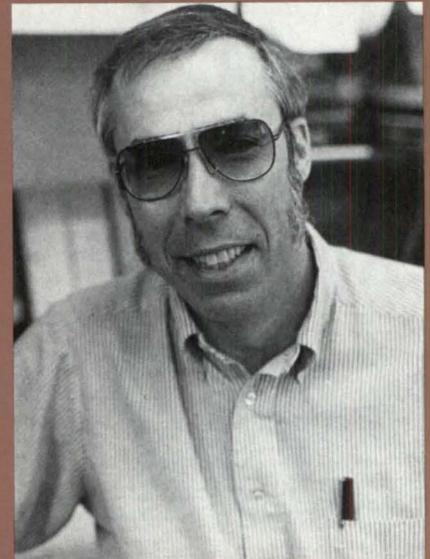
John W. Eaton, Ph.D., professor in the Department of Laboratory Medicine and Pathology, was one of 20 faculty members to receive a grant at the Minnesota Medical Foundation's summer meeting of the board of trustees. In all, the MMF board approved \$166,251 in faculty research grants, student research grants, and special grants (see adjacent article).

Eaton received \$5,000 in support of his project entitled "Redox Reactions of Ocular Ascorbic Acid."

In describing the project, Eaton says, "The eye (both the lens and the fluids which surround the lens) is particularly rich in ascorbic acid (vitamin C). This work will explore the idea that the function of vitamin C in the eye is to reduce oxygen to water, thereby maintaining the lens in the state of deoxygenation. This lack of oxygen—which would be harmful to most other tissues—may help preserve the constituents of the lens in a clear and undamaged state. Breakdown of this system may lead to the formation of cataracts."

Eaton states that the lens has an unusual strategy for the avoidance of oxidant damage. Ascorbic acid, present in high concentrations in the aqueous and vitreous humors surrounding the lens, may affect the reduction of oxygen. Lens metabolism may then actively convert the by-products, hydrogen peroxide and dehydroascorbate, to water and ascorbic acid (the latter by way of reaction between dehydroascorbate and reduced glutathione).

These reactions may deoxygenate the lens, Eaton says, because the lens lacks blood (oxygen) supply and, with the possible exception of the very peripheral epithelium, does not require oxygen. The resultant lack of oxygen may prevent lenticular oxidant damage. A correlative proposition is that breakdown of this 'antioxygen' system may be an important element in the genesis of lenticular diseases such as senescent,



Dr. John W. Eaton

diabetic, and UV-induced cataract.

Eaton says, "These investigations may lead to valuable new information concerning the function of ocular ascorbic acid and, by implication, may yield insight into the pathogenic mechanisms responsible for important degenerative diseases of the lens such as senescent, diabetic, and UV-induced cataract."

Eaton received his Ph.D. in biological anthropology from the University of Michigan. He was director of the Division of Medical Genetics in the Department of Laboratory Medicine and Pathology at the University of Minnesota from 1979-1990, and currently is professor in the Departments of Medicine and Laboratory Medicine and Pathology and director of the Red Cell Physiology Laboratory.

Eaton is 1992 chairman of the Gordon Research Conference on Oxygen Radicals in Biology and Medicine, and was 1987 recipient of the Gordon Research Conference's Iron Bolt Award. He was also the 1990 recipient of the University of Minnesota's Gordon L. Starr Award for Outstanding Service to Students. □

MMF Grants

Continued from page 22

hemorrhagic cystitis.

Special grants include: **Kenneth Bloom, M.D.**, Dermatology, \$9,000, Gene mapping of the human tyrosinase and tyrosinase pseudogene loci; **Robert Hebbel, M.D.**, Medicine, \$10,000, Purchase of HPLC for shared use; **S. Michael Mauer, M.D.**, Pediatrics, \$15,000, Cryo attachment for Richert microtome; **Jose Pardo, M.D., Ph.D.**, Psychiatry, \$12,000, Analysis methods for neuropsychiatric diagnostic imaging; and **Sundaram Ramakrishnan, Ph.D.**, Pharmacology, \$10,000, Studies on a high molecular weight antigen (OVX) expressed on ovarian cancer cells.

Student grants include: **Ellen Anderson**, Year 4, \$1,800, Kinetics of suppression of corneal graft rejection by deoxyspergualin in the allogeneic rat penetrating keratoplasty model; **Julie Baker**, Year 4, \$1,800, Effect of deferoxamine on hematoma-induced flap necrosis in pigs; **Holly Batal**, Year 3, \$1,800, Expression of the yeast RAD51 gene in yeast and *E. coli*; **Michael Beckish**, Year 3, \$1,800, Interleukin-1

mediation of dysfunctional cardiac compliance in sepsis; **Ellen Bendel**, Year 4, \$1,800, Familial occurrence and mode of inheritance of the polyasplenia syndrome; **Michelle Blaeser**, Year 4, \$1,800, Glucose regulation of insulin mRNA levels in HIT cells; **John Cromwell**, Year 3, \$1,800, Role of interleukin-6 in the hyperacute rejection of heterotopic cardiac xenografts in the guinea pig to rat model; **Daniel Dunn**, Year 4, \$1,800, In vitro effects of arachidonic acid metabolites on coronary collaterals; **Jeffrey Dvergsten**, Year 4, \$1,800, Clusterin and renal cell injury; **Mary Eaton**, Year 3, \$1,800, Transferrin receptor regulation in placental tissue of infants of diabetic mothers; **Thomas Ferry**, Year 4, \$1,800, Myocardial electrocardiogram determination of cardiac rejection; **Richard Goodwin**, Year 3, \$1,800, New modalities in prevention of spinal cord injury from cross-clamping of the thoracic aorta; **Patrick Hall**, Year 4, \$1,800, Radiation enteritis - luminal interventions; **Michael Hall**, Year 4, \$1,800, Nerve growth factor enhancement of adrenal medullary tissue transplants when administered as a biodegradable sustained-released polymer micro-

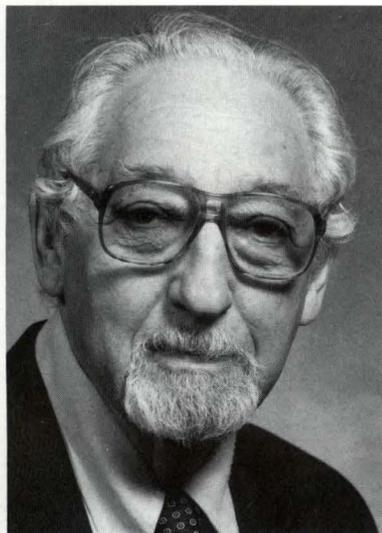
sphere; **Mark L. Johnson**, Year 4, \$1,800, Cytokine mediation of septic cardiac dysfunction; **Richard Karlen**, Year 4, \$1,800, What effects do inhalational anesthetics have on skin catecholamine levels in random cutaneous flaps in the pig?; **Jeffrey Klassen**, Year 4, \$1,800, Characterization of the effects of TGF- β on the phenotypic expression of degenerative disc cells; **Richard Long**, Year 4, \$1,800, Will urinary diversion prevent urinary bladder fibrosis after seromuscular enterocystoplasty?; **Mark Reding**, Year 4, \$1,800, Does leucine enter *Toxoplasma gondii* tachyzoites through tubular structures in the parasitophorous vacuole?; and **Randall Zimmerman**, Year 4, \$1,800, Mechanical properties of bone explant after sterilization with low level heat.

Advanced admission student grants include: **Daniel M. Anderson**, Year 91, \$1,200, Fluorescent dye staining of synaptic terminals; **Jon Ebbert**, Year 92, \$1,200, Study of humoral immune characteristics of children with chronic OME; and **Stephen Spates**, Year 92, \$1,200, The Medi-Child Project. □

Lifson/Johnson Memorial Award established at MMF

A new award designed to recognize superior research in the area of physiological transport systems has been established at the Minnesota Medical Foundation.

The Lifson/Johnson Memorial Award,



Dr. Nathan Lifson

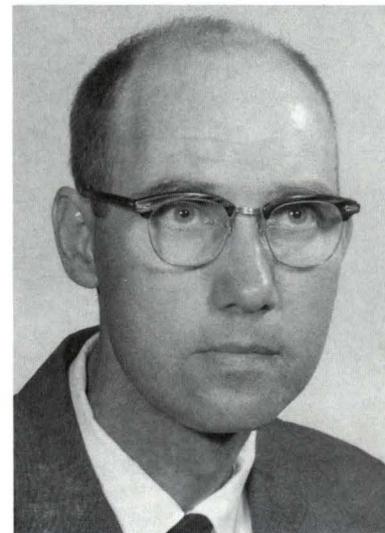
a permanently endowed annual prize for graduate students in physiology, will be presented for the first time in the spring of 1992. It honors the memory of two former University faculty members, Dr. Nathan Lifson and Dr. John A. Johnson.

Lifson and Johnson were long-time colleagues who enjoyed a close personal and professional association, had a common interest in research concerned with the processes involved in the transport of materials across cellular membranes in living organisms, and shared a deep commitment to teaching.

Dr. Lifson, who died in 1989, retired in 1981 after a long and distinguished career at the University. A fund established in his honor at the time of his retirement has continued to grow and now becomes part of the new endowment. Dr. Johnson, an internationally known professor of physiology and a member of the faculty since 1951, died of lymphoma in 1987. A memorial fund established at the time of his death will

likewise constitute part of the new award's endowment principal.

Gifts may be directed to the Lifson/Johnson Memorial Award Fund at the Minnesota Medical Foundation. □



Dr. John A. Johnson

First annual MMF Golf Classic held

The first annual MMF Golf Classic was held September 4 at Edinburg, U.S.A. in Brooklyn Park. More than 160 alumni, faculty, donors, and friends of the Minnesota Medical Foundation participated in the event and enjoyed the challenging course and excellent weather.

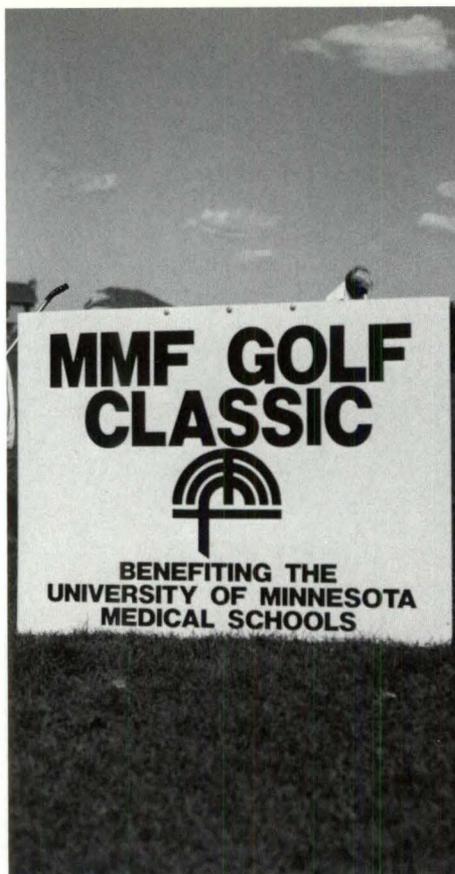
The Golf Classic was a fundraiser for MMF's Medical Research Fund. Approximately \$15,000 was raised, exceeding the goal.

Honorary chair of the event was Les Bolstad; co-chairs were Drs. Greg Vercellotti and Tim Walseth. Other committee members included Dr. Fred Apple, Dr. Lane Arey, Barbara Becker, Bob Burgett, Dr. Chuck Daniels, Dr. John Davenport, Bill Flanagan, Chuck Gooder, Dr. Steve Haines, Kelly Heid, Dr. Mike Kelly, Dr. Dave Kendall, Dr. John LaBree, Dr. Russell Lucas, Sue Maddux, Dr. Dennis Nie-wohner, Dr. Scott Nyberg, Brian Ponto, Dr. Paul Quie, Pam Reimer, Dr. Lee Sabath, Jack Stack, David Teslow, and Dr. Jim White.

Major sponsors of the event included First Asset Management & First Trust (banquet), Medtronic, Inc. (19th hole), Alliance Capital (beverage cart #1), Radisson Metrodome U of M Hotel (beverage cart #2), and Cutter Biological/Miles (putting green).

Hole sponsors included IDS Advisory Group, KPMG Peat Marwick, Abbott Laboratories (Pharmaceutical Division), Bolger Publications/Creative Printing, Critical Care, Sandoz, Carlson Travel-U of M, Glaxo Pharmaceuticals, AMGEN, Baxter Hyland, Immunex, Miles, Inc., Caremark, Octagon Financial Group, Inc., Piper Jaffrey/Piper Capital, Lederle, Rainbow Signs, and Merck, Sharpe & Dohme.

Other sponsors included Beckman Instruments, Ciba Geigy, Hodapp Surgi-



cal Supply, Inc., Linhoff Corporate Color, Marquette Bank, Minneapolis Floral, Norwest Equipment Finance, Ortho Biotech, Roering Pfizer, and Wayne G. Smith III, M.D.

Additional gifts and prizes were provided by Brief Encounter-Myles Jacob, Cafe Solo-Dr. Richard King, Clintec Nutrition Co., Dr. Dave Kendall, La Terrasse-Hotel Sofitel, Lund's Funds, MacBirdie Golf Gifts, Minnesota Vikings, Dr. Scott Nyberg, Paradise Clothing-Myles Jacob, University of Minnesota (U of M) Alumni Association, U of M Cancer Center, U of M Golf Course and Chris Korbol, U of M Hospital and Clinic, U of M Men's Athletics, and WCCO Radio.

The second annual MMF Golf Classic is scheduled for August 31 at Hazeltine National Golf Club. For more information or details on how to become involved in the planning process, contact the MMF alumni office at (612) 625-1440. □

Parents' Day a success

More than 150 parents of first-year medical students learned about life at medical school at the sixteenth annual Parents' Day, held October 19 on the Twin Cities campus.

The day-long program included welcoming remarks by Aggy Lun, president of the Medical Student Council; David Teslow, president of MMF; and Dr. David Brown, dean of the Medical School. Dr. Donald Robertson, assistant dean for admissions, spoke about the selection and makeup of the 1991-92 class, and Dr. Robert McCollister, associate dean for curriculum affairs, explained the Medical School curriculum to the parents.

Dr. Helene Horwitz, assistant dean for student affairs, talked to the parents about the hopes, dreams, and concerns of prospective physicians, and freshman class president Roy Brown gave the parents a student's perspective on the first few months of school.

Parents' Day also included tours of the Medical School and the hospital, lunch at the Outside Inn cafeteria in the Phillips-Wangensteen building, and a reception at the conclusion of the day at the Bridges cafeteria in the hospital.

Parents' Day is sponsored by the Minnesota Medical Foundation and the Medical Student Council. □



Under Our Umbrella

MMF highlights the many organizations and special funds under its umbrella at the Fifty-Third Annual Meeting.



The Minnesota Medical Foundation provides a wide variety of services to the many organizations and hundreds of special funds under its umbrella. A number of these organizations were highlighted at the 53rd Annual Meeting, held October 29, 1991, at the Radisson Metrodome U of M Hotel.

Spotlighted in displays and a new multimedia presentation were the University Children's Foundation, the Vision Foundation, the University of Minnesota Cancer Center, the Children's Cancer Research Fund, the Medical Alumni Society, the School of Public Health, and the Department of Obstetrics and Gynecology.

Events on the program included reports by MMF Chairman James W. Reagan and MMF President David R. Teslow, academic awards presentations, donor recognition, and introduction of new board members and special guests. New to the Annual Meeting was "The Gift of Life," a presentation showing the relationship between donors, doctors, and patients.

Distinguished Teaching Awards were announced for recipients Drs. Arthur Aufderheide and Linda VanEtta of the UMD School of Medicine, and for Drs. Walter Hildebrandt, Chris Longbella, Patrick Schlievert, and Valeria Ulstad of the Twin Cities Medical School. Dr. Robert Vernier was introduced as recipient of the 1991 Outstanding Medical School Teacher of the Year Award, and Dr. Steven Fling was recognized as recipient of the J. Jacob Kaplan Research Award.



Four individuals were confirmed as new members of the MMF board of trustees. The board is comprised of faculty of the University of Minnesota Medical Schools, leaders in the medical community, and representatives of the corporate community. The board is charged with the overall guidance of MMF in accomplishing its mission of raising and disbursing funds for medical education and research at the University of Minnesota Medical Schools in the Twin Cities and Duluth.



Lowell C. Anderson of Lilydale is chairman of the board, president, and CEO of North American Life and Casualty Company of Minneapolis. He has been active in the community, serving as Minnesota state chairman of the American Heart Association, on the boards of the Minneapolis Chamber of Commerce and the YMCA of Minneapolis, and on the finance committee of the Viking Council of the Boy Scouts of America.

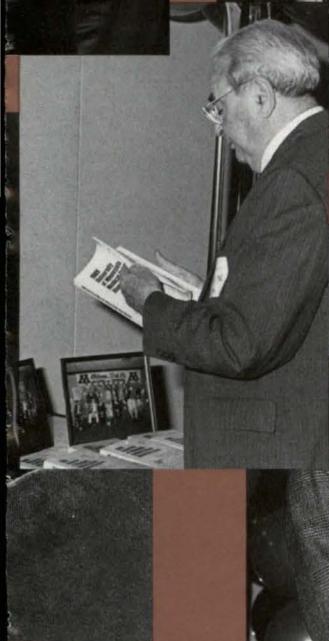


Margaret Matalamaki is a retired educator from Grand Rapids who serves on the board of governors of the University of Minnesota Hospital and Clinic and has had many ties to the University through the Alumni Association, the North Central Agricultural Experimental Station in Grand Rapids, the 4H Founda-





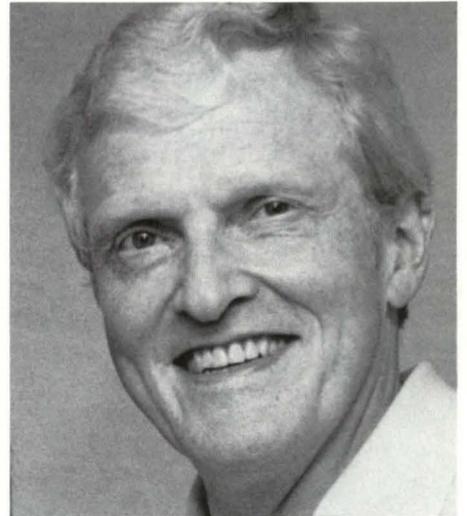
PHOTOS BY NANCY MELLGREN



tion and others. She is currently chair of the C.K. Blandin Foundation, and is active in a number of Grand Rapids civic organizations.



Dennis M. Mathisen of Chanhassen is president of Marshall Financial Group, Inc. of Minneapolis. He has been involved with the University of Minnesota through the Alumni Association and the Law School Alumni. His activities in the community include serving as trustee of the Minnesota Institute of Arts, chairman of the Children's Theatre, and director of the Minnesota Humanities Commission.



John B. Sanford, M.D., of Duluth is a recently retired surgeon and professor of clinical sciences at the UMD School of Medicine. He has been involved with MMF through the Centennial Scholarship Fund. A 1948 graduate of the University of Minnesota Medical School, Dr. Sanford has been chief of surgery at St. Mary's, St. Luke's, and Miller Dwan hospitals in Duluth. He is active in the Duluth community, working with the Symphony Association, the Duluth Depot fund drive, and the Tilderquist Memorial Library. □

ALUMNI UPDATE

Dear Colleagues,

As I write this, we have just held our first MAS board meeting of the year. Committees were formed, various directors agreed to recruit reunion chairs for next June, and there was much discussion about the ever-increasing need for scholarship dollars for medical students.

The annual alumni phonathon is going on now, and the response has been terrific. The dollars raised from this effort are targeted for scholarship, research, and other programs and activities carried out by the Minnesota Medical Foundation in support of our alma mater. I encourage you to respond with a generous gift before December 31.

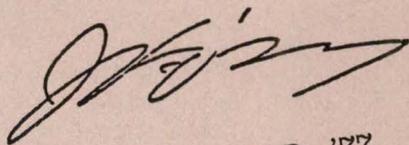
We are again planning several alumni and friends receptions for northern and southern California for February 8-16, 1992. Anyone interested in hosting one of these receptions should contact the Medical Alumni Office.

Reunions for the classes of 1932, 1942, 1947, 1952, 1962, 1967, 1972, and 1982 will be held June 4-6, 1992. All alumni from these years are encouraged to attend. The reunion program is in its 6th year and continues to be very successful. Anyone interested in serving on the committee for his or her class should contact the alumni office.

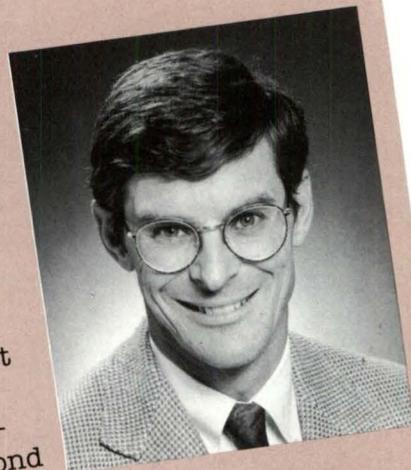
Nominations for the 1992 Harold S. Diehl Award are currently being accepted. Presented at the MAS Annual Meeting each spring, the Diehl Award recognizes outstanding service and contributions by one of our colleagues. If you know of a classmate or colleague deserving of this honor, I encourage you to forward a nomination to the alumni office.

Comments, questions, or updates from alumni are always welcome. Please don't hesitate to send them to the Medical Alumni Office, Minnesota Medical Foundation, Box 193 UMHC, Minneapolis, MN 55455, or call (612) 625-1440.

Sincerely,



John F. O'Leary, M.D., '77
President
Medical Alumni Society



Diehl Award Nominations

Donald B. Swenson, M.D., '51, invites nominations for the Harold S. Diehl Award. The award will be presented at the Medical Alumni Society's Annual Meeting and Luncheon on June 6, 1992. Given in honor of the University of Minnesota Medical School's fifth dean, Harold Sheely Diehl, M.D., the award is presented to an individual who has made outstanding professional contributions throughout his or her career. The Diehl Award has been presented to 62 people since its inception in 1962.

Qualifications for nomination are:

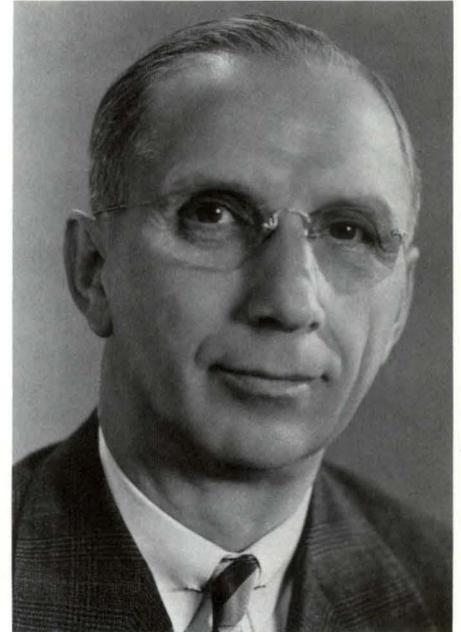
1. Preferably a graduate of the University of Minnesota Medical School;
2. Not currently engaged in an academic capacity;

3. Outstanding contributions to the Medical School, the University, the alumni, and the community;
4. Relatively long experience in the field of medical service or a related field.

Nominations should be received by April 15, 1992, and should be sent to:

Donald B. Swenson, M.D.
Chairperson
Harold S. Diehl Award Committee
Box 193 UMHC
Minneapolis, MN 55455

Nominations should include supporting documents and references to assist the committee in its deliberations. Questions may be referred to the Medical Alumni Society at the Minnesota Medical Foundation. Telephone (612) 625-1440.



Dr. Harold S. Diehl

California Receptions

Receptions for alumni and friends of the University of Minnesota Medical Schools are scheduled for northern and southern California the week of February 8 to 16, 1992.

Plans include northern California receptions at the San Rafael home of Drs. William and Margaret Filante on February 8 and at the San Jose home of Dr. Francis Stutzman on February 9.

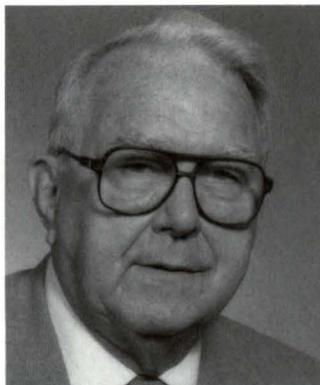
Southern California receptions are planned for the Palm Springs home of Dr. George Doroshov on February 12, the Rancho Palos Verdes home of Dr. Yossef Aelony on February 15, and the La Jolla home of Dr. John Amberg on February 16. Another reception may be held in the Sacramento area.

Medical School Dean David M. Brown and former Dean Neal L. Gault will be attending the receptions to update alumni and friends on happenings at the University of Minnesota Medical Schools.

If you plan to be in California during the month of February and are interested in attending one of the receptions, please call the alumni office at (612) 625-1440 to receive an invitation with all the details.



Dean David M. Brown



Dean Neal L. Gault

26th General Hospital Unit Reunion

Plans are progressing for the 50-year reunion scheduled for June 4, 1992. The program will include plenty of time for the officers, nurses, and enlisted men to share memories, view pictures and movies, and sing another rendition of "Oh Susannah." Russ Lindgren still has that embroidered banner and it will be on display.

We are still seeking addresses on members of the 26th. Several have passed away, but we do want to invite surviving spouses. Information and inquiries can be directed to:

26th General Hospital Unit
Minnesota Medical Foundation
Attention: Bob Burgett
Box 193 UMHC
Minneapolis, MN 55455
Phone: (612) 625-1440

CLASS NOTES

In Memoriam

1940

Dr. Michael A. Wainstock, Bloomfield Hills, Michigan, recently retired as head of ophthalmology ultrasound at the University of Michigan. Dr. Wainstock was awarded the Quest Award for outstanding service by a faculty member for two years in a row.

1948

Dr. John E. Verby, Bloomington, Minnesota, was a recipient of the American Academy of Family Physicians' Thomas W. Johnson Award. The award recognizes persons who have made outstanding contributions to education for family practice, and undergraduate, graduate, and continuing education spheres. Dr. Verby is a professor at the University of Minnesota Medical School.

1952

Dr. Duane R. Hedine, Walla Walla, Washington, recently retired from practicing urology. He continues to work part time as medical director of a Blue Shield affiliate, and spends leisure time tending his 600-tree fruit orchard.

1959

Dr. Carl G. Evers, Jackson, Mississippi, was elected to the American Medical Association Council on Medical Education in June. Dr. Evers is professor of pathology, associate dean for academic affairs, and director of the cytotechnology training program at the University of Mississippi Medical Center.

1960

Dr. Bernard Pollara, Albany, New York, was named the 1991 Academic Laureate by the New York State University at Albany Foundation. Dr. Pollara is currently professor and chairman of pediatrics at the Albany Medical College.

1963

Dr. David A. Swanson, St. Paul, Minnesota, has been named chief of the

Department of Medical Imaging at St. Paul-Ramsey Medical Center. He is also an assistant professor at the University of Minnesota Medical School. Dr. Swanson serves on the bioethics committee and chairs the radiation safety committee at St. Paul-Ramsey.

1966

Dr. Robert W. McKenna, Dallas, Texas, was named the first Childers professor of pathology at the University of Texas Southwestern Medical Center. The professorship memorializes the late Dr. John H. Childers.

1974

Dr. Darrel J. Rosen, East Grand Rapids, Michigan, was recently named a fellow of the American College of Radiology. Fellowships are awarded for significant scientific or clinical research in the field of radiology, or significant contributions to its literature.

1984

Dr. Deborah A. DeMarais, Shoreview, Minnesota, recently finished a four-year assignment in the USAF. Dr. DeMarais joined the Columbia Park Medical Group in Minneapolis during September.

1988

Dr. Keith Stelter, Moose Lake, Minnesota, recently joined Gateway Family Health Clinic. He is also teaching part time for the Rural Physician Associates Program and at Duluth's Family Practice Residency. Dr. Stelter is one of 12 national Parke-Davis Teacher Development Award winners.

1989

Dr. John Simmer, Erlangen, Germany, was awarded the Bronze Star Medal for meritorious achievement while serving in Operation Desert Storm as Medical Treatment Platoon Leader. He is currently in Germany serving in the U.S. Army as Brigade Surgeon.

Roger L. Anderson, M.D.,

Class of 1952, retired family practitioner from Crystal, Minnesota, died August 23 at age 71. Dr. Anderson practiced at the Crystal Clinic and was on staff at North Memorial Medical Center in Robbinsdale. He retired in 1983. Dr. Anderson was a member of the board of directors at North Memorial. He is survived by his wife, Marian, six daughters, a brother, and nine grandchildren.

Kenneth L. Bauman, M.D.,

Class of 1943, former surgeon from Lancaster, Wisconsin, died in July 1991. Memorials have been referred to the Minnesota Medical Foundation, P.O. Box 64001, St. Paul, Minnesota 55164-9793.

Alex G. Berger, M.D.,

Class of 1932, general practitioner from Edina, Minnesota, died in September at age 87. He is survived by his wife, Vivian, four daughters, one son, and 16 grandchildren.

Morris Cable, M.D.,

Class of 1926, Minneapolis family practitioner for more than 40 years, died September 22 at age 88. Dr. Cable was on staff at St. Mary's and Mount Sinai hospitals in Minneapolis. He is survived by his daughter, daughter-in-law, sister, and grandchildren.

Richard M. Duff, M.D.,

Class of 1966, family practitioner from Minneapolis, died in September at age 51. Dr. Duff practiced at Palen Clinic in Minneapolis for many years. He is survived by his wife, Delphine, three sons, three brothers, and many nieces and nephews.

John G. Galligan, M.D.,

Class of 1945, St. Paul pediatrician and clinical associate professor of pediatrics at the University of Minnesota, died August 12 at age 69. Dr. Galligan was one of the first pediatric cardiologists in the Twin Cities, where he served on the staff at the Variety Club Heart Hospital. He also served on the medical staff at the University of Minnesota Medical School. He was chief of staff at St. Paul Children's and St. Joseph's hospitals, and was attending pediatrician at St. Paul's Shriners Hospital for Crippled Children. He was also director of pediatrics at St. John's Hospital where he later became director of medical education until his illness forced him into retirement. Dr. Galligan was voted teacher of the year by St. John's hospital staff. He was a member of the American Academy of Pediatrics, the American Medical Association, Ramsey County Medical Society, and the Minnesota Academy of Medicine. In addition, he served on many hospital, medical, and public committees, including secretary of the Northwestern Pediatric Society and chairman of the Child Committee and the Resource Committee on Maternal and Child Health for the Minnesota Medical Association. Dr. Galligan is survived by his wife, Mary, two daughters, six sons, two sisters, one brother, and nine grandchildren.

Saul T. Hersh, M.D.,

Class of 1929, retired physician from Piedmont, California, died September 18. Dr. Hersh was a member of the American Society of Vienna, California Medical Association, and the International College of Surgeons. He is survived by his wife.

Stephen C. Rector, M.D.,

Class of 1979, associate professor of surgery and internal medicine at West Virginia University, died July 20 at age 46. Dr. Rector was medical director of the Emergency Department at WVU Hospitals and was co-founder of HealthNet, an emergency medical helicopter service in West Virginia. He was president of the West Virginia chapter of the American College of Emergency Physicians and was a staff member of Davis Memorial and Camden-Clark Memorial hospitals in Parkersburg. Dr. Rector instructed practicing physicians and emergency medical providers in trauma and cardiac life support techniques. He was a member of the Society for Academic Emergency Medicine, West Virginia Medical Association, the Monongahela County Medical Society, and Physicians for Social Responsibility. He contributed to various newspaper and magazine articles and also appeared on radio and television to support seat belt laws. Dr. Rector was honored by colleagues and staff members at WVU Health Sciences Center with the establishment of the Stephen C. Rector Visiting Lectureship in Emergency Medicine. He is survived by his wife, Nancy, a son, and a daughter.

Russell O. Sather, M.D.,

Class of 1934, long-time internal medicine physician from Crookston, Minnesota, died September 9 at age 83. Dr. Sather began his practice at Northwestern Clinic in 1937 and retired in 1981. He was a member of the Minnesota State and American Medical Association, and was on the Minnesota State Board of Medical Examiners for 30 years, serving as president for three terms. He is survived by a daughter, son, sister, and five grandchildren.

We also have received notice of the following:

Ronald Edstrom, Ph.D.,

Professor of biochemistry at the University of Minnesota, died August 26 at age 55. Dr. Edstrom joined the University of Minnesota faculty in 1965 and also taught at the Mayo Medical School in Rochester. Dr. Edstrom's pioneering work in the field of biochemistry was known worldwide. He was an advisor to many doctoral students, and developed and directed Career Opportunities in Health Sciences for minority high school students. Dr. Edstrom wrote for many scientific journals and served as a consultant on several national committees, including the American Diabetes Association, Veterans Affairs Department, and the National Science Foundation. Memorials to the Edstrom Scholarship Fund at the Minnesota Medical Foundation were suggested. He is survived by his wife, Marilyn Meinke, three sons, and two daughters.

Elva Lovell,

From Roseville, Minnesota, died in October at age 74. Mrs. Lovell, who had multiple sclerosis, established the Walter D. and Elva B. Lovell Endowed Research Fund through the Minnesota Medical Foundation for the study of neurosciences, with special emphasis given to such debilitating nervous or brain disorders as multiple sclerosis, Parkinson's disease, Alzheimer's disease, epilepsy, cerebral palsy, mental retardation, and chronic pain. In addition, the Walter and Elva Lovell Scholarships are given by MMF to two students each year to help them complete their medical training. Elva Lovell was a member of the University of Minnesota Trustees Society. She is survived by her brother and sister-in-law.

—Jan Hickey

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Minneapolis, MN 55455
612-625-5463

W92

THANKS FOR GIVING

Dr. Harold J. Lawn

by Jean Murray

Brain power is important to Dr. Harold Lawn. He knows what can be accomplished when students' ideas are allowed to flourish and take root, and so he channels his giving in ways that support and stimulate intellectual development and excellence.

Dr. Lawn's gifts primarily support research projects of resident students—men and women preparing for academic, research, and professional careers in psychiatry.

A 1934 graduate of the University of Minnesota Medical School, Dr. Lawn's professional career has been in the field of psychiatry, and he is dedicated to helping others in this area of medicine.

Dr. Lawn decided at a young age that he wanted to be a doctor, and at age 12 started to save his paper route money for medical school. Earnings from his life-guard position at Cedar Lake and from a job in the circulation department at the *Minneapolis Journal* helped pay for his medical education.

After completing his psychiatry training at the University of Minnesota, Dr. Lawn returned to medical school at Northwestern University in Illinois for four more years of training in neurology. He realized then the critical importance of ongoing education in a constantly changing field, and continues to be an advocate of life-long learning—especially for those in the field of medicine.

Dr. Lawn spent 20 years of his career as a faculty member in the Department



Dr. Harold J. Lawn

of Psychiatry at Northwestern University's medical school, and later returned to Minnesota where he joined the University of Minnesota Medical School faculty. He is currently professor emeritus in the Department of Psychiatry.

Dr. Lawn considers his years as a working medical student with limited funds the motivating factor behind his desire to help students. The goal of his generosity is to "build brains," and it gives him great satisfaction to know that

his gifts will be used by the Department of Psychiatry for the educational advantage of students.

The Minnesota Medical Foundation is deeply grateful to Dr. Harold Lawn for his generous gifts. His support of graduate students in the Department of Psychiatry will bring about advances in the field that might otherwise not have been possible, and his emphasis on the importance of giving serves as an example to many others.





Minnesota Medical Foundation

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CALENDAR OF EVENTS

Pulmonary Function Testing Workshop

CME (612) 221-3992

January 30-31

Medical Directors' Training Program 7B

Radisson Hotel Metrodome
CME (612) 626-7600

January 30-February 1

Hospital Health & Safety Risk Assessment & Management

CME (612) 221-3992

February 5-6

Domestic Violence: Assessment and Plan for Physician Action

St. Paul-Ramsey Medical Center Amphitheater
CME (612) 221-3992

February 7

Burn Care Today

Holiday Inn East, St. Paul
CME (612) 221-3992

February 14

Medical Directors' Training Program 6C

Holiday Inn Crowne Plaza
CME (612) 626-7600

February 20-22

Geriatric Drug Therapy Symposium

Radisson Hotel Metrodome
CME (612) 626-7600

February 26-27

Prevention and Management of Atherosclerotic Diseases

Radisson Hotel Metrodome
CME (612) 626-7600

February 28

Family Practice Today

Holiday Inn East, St. Paul
CME (612) 221-3992

March 12-13

SAVE THIS DATE!
The 2nd Annual
MMF Golf Classic
will be held
August 31, 1992
at
Hazeltine National
Golf Club
Home of the
1991 U.S. Open
Golf Tournament
For more information, call:
(612) 625-1440.