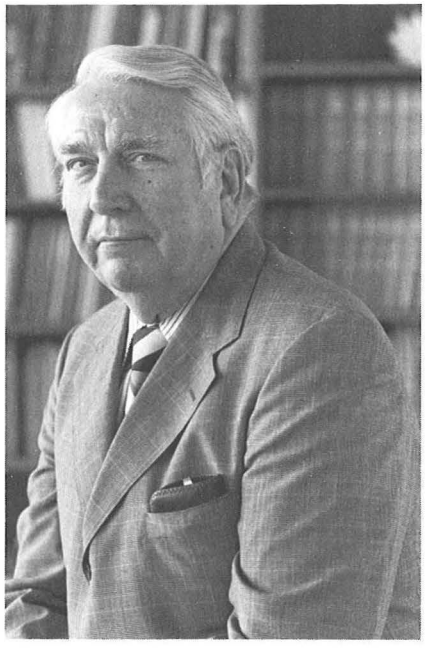
Health Science Spectrum

BURN TRAUMA:
a race against time

President's Message:

A time for understanding – both sides



The recent controversy over the statement made by Gov. William Clements that among State agencies and institutions, higher education is guilty of the greatest waste of State funds, is both understandable and unfortunate. The perception of institutions of higher education as being poorly managed and wasteful, justified or not, is shared by an increasing number of taxpayers. Let's face it, there are varying degrees of inefficiency in all our institutions, but to think that management tools that have been effective in industry are a panacea to our institutional problems suggests a lack of understanding of the difference between a business enterprise and a university. That is not to say that appropriate, sound management principles should not and, indeed, have not already been incorporated into our operations. But to suggest that one can transpose a management structure that has been successful in a business setting to a university and expect similar results is naive. The product of a university is not the same as the product of a business.

In an address to the Austin Society of Public Administrators, Dr. Peter Flawn, president of The University of Texas at Austin, summed up the situation in the following manner: "Unless we argue that management has a purpose of its own and exists for and of itself, then we must hold that the legitimate social and organizational purpose of management is to carry forward the purpose of the organization being managed, the purposes of the institution."

Until now public institutions of higher education in Texas, certainly those involved in health professional education, have received, for the most part, adequate Legislative support. Clearly we are approaching the time when increasingly restricted funds from all sources will force all institutions to review both their programs and the management thereof, to see that institutional goals and purposes are being met.

While Legislative support of higher education has grown steadily, an unfortunate paradox is that salary levels of both faculty and staff, in terms of purchasing power, have steadily declined over the past decade. Our annual turnover rate among classified personnel is now in excess of 50 percent, a level that creates both inefficiency of operation as well as increased costs. The differential in salary between what we can offer our faculty and what physicians can earn in practice, or what faculty members are being offered at other institutions, poses an equally serious problem. Unfortunately, the remarkable loyalty of faculty and staff, which has characterized this institution for many years, is beginning to show signs of some erosion. Both the Coordinating Board of the Texas College and University System and the Special Commission in Higher Education have recommended salary increases over the next biennium in the range of 31-35 percent. Certainly, something of this magnitude will be essential if we are to reverse the current trend and maintain the quality of our current programs.

This range of salary increases apparently seems shocking to the public, but perhaps we in higher education have been too reticent in discussing our goals, our successes and our problems. Perhaps we have assumed a lack of interest on the part of the public.

On the one hand, Gov. Clements' comment may have lacked adequate data to support his contention about higher education's great waste of funds. On the other hand, the ad hominem response of some university administrators has done little to disprove it. Perhaps some protest too much.

It is time, however, to move from accusations and defensiveness to improved communications and understanding. I anticipate that, with the creation by the governor of the Higher Education Effectiveness Council and the Medical Education Effectiveness Council, this will happen. I hope that these new structures for communication will very soon result in "less heat and more light." Both sides need to be better informed of the other party's position and be willing to take the necessary steps to see that our institutions are appropriately funded and operated as efficiently as possible in carrying out their basic purpose. •

Charles C. Sprague, M.D.
President

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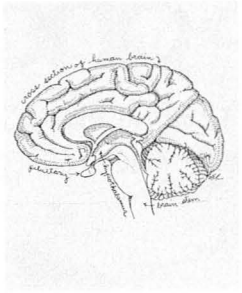

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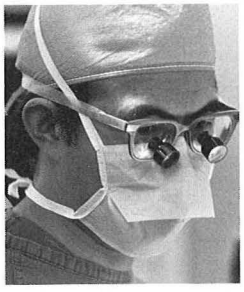

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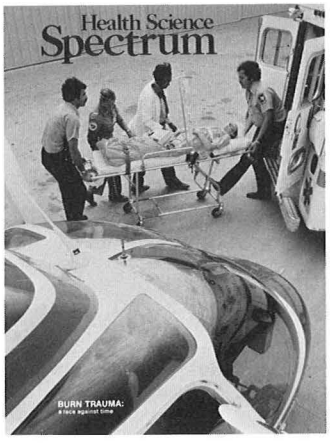


On the cover: Time is of the essence in treating critically burned patients. Parkland Burn Center, headed by Dr. Charles Baxter of the health science center faculty, is a national leader in burn treatment and research. The center draws patients from all over the nation and now has international air transport capability. Baxter, two Dallas Fire Department paramedics and a registered nurse transfer a patient from helicopter to Mobile Intensive Care Unit en route to Parkland.

Photograph by Terry Cockerham

See story page 6.

Whatever turns you on... and off

New discoveries in neuroendocrinology lead to understanding the body's brainy messenger system

BY SUSAN RUTHERFORD

An exciting new picture is emerging to explain why we become sexually aroused, cold, hungry, thirsty, fat and probably even elated or depressed.

And it's all based on a remarkable triggering system in the brain that controls a vast network of chemical messengers at work throughout the body.

Brain researchers at Southwestern Medical School working in neuroendocrinology, a young branch of biomedical science dealing with the secretions of brain nerve cells (neurons) and also with the effects of bodily secretions on the brain, are discovering "new" brain secretions.

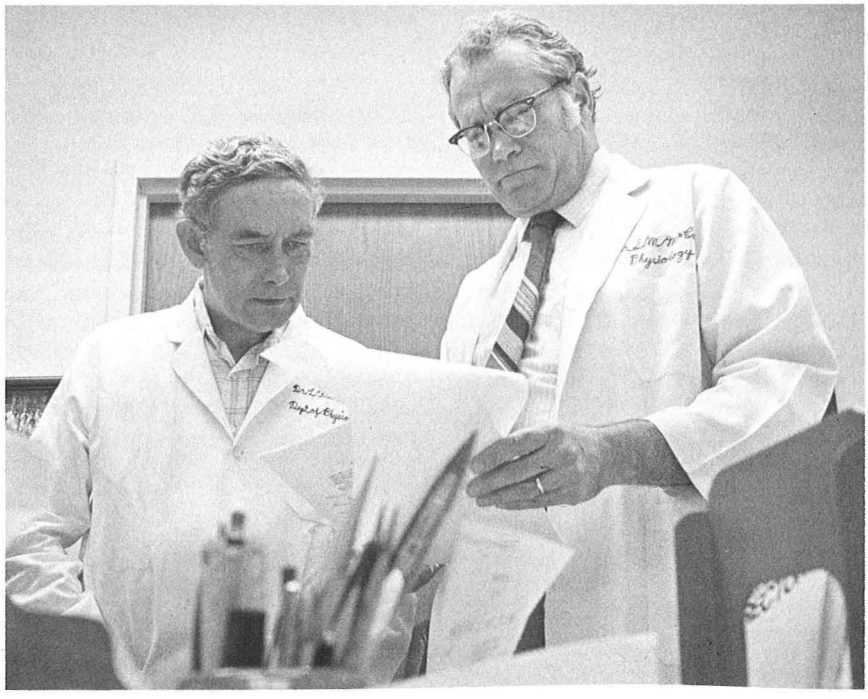
And each of these chemical secretions carries with it a whole spectrum of effects both locally and on the rest of the body. As the initiators in a cascade of secretions by brain and body cells, the brain's chemical transmitters are implicated in regulating seemingly unrelated body processes – emotional response, memory, growth, pleasure, pain, and the list goes on.

Dr. Samuel M. McCann, chairman of the school's Physiology Department, helped pioneer study in neuroendocrinology when in 1960 he discovered proof of the existence of LHRH (luteinizing hormone-releasing hormone). The LHRH discovery was made at the same time by a group in England – a group that included biochemist Dr. Peter Fawcett, who is also on the Southwestern Physiology faculty.

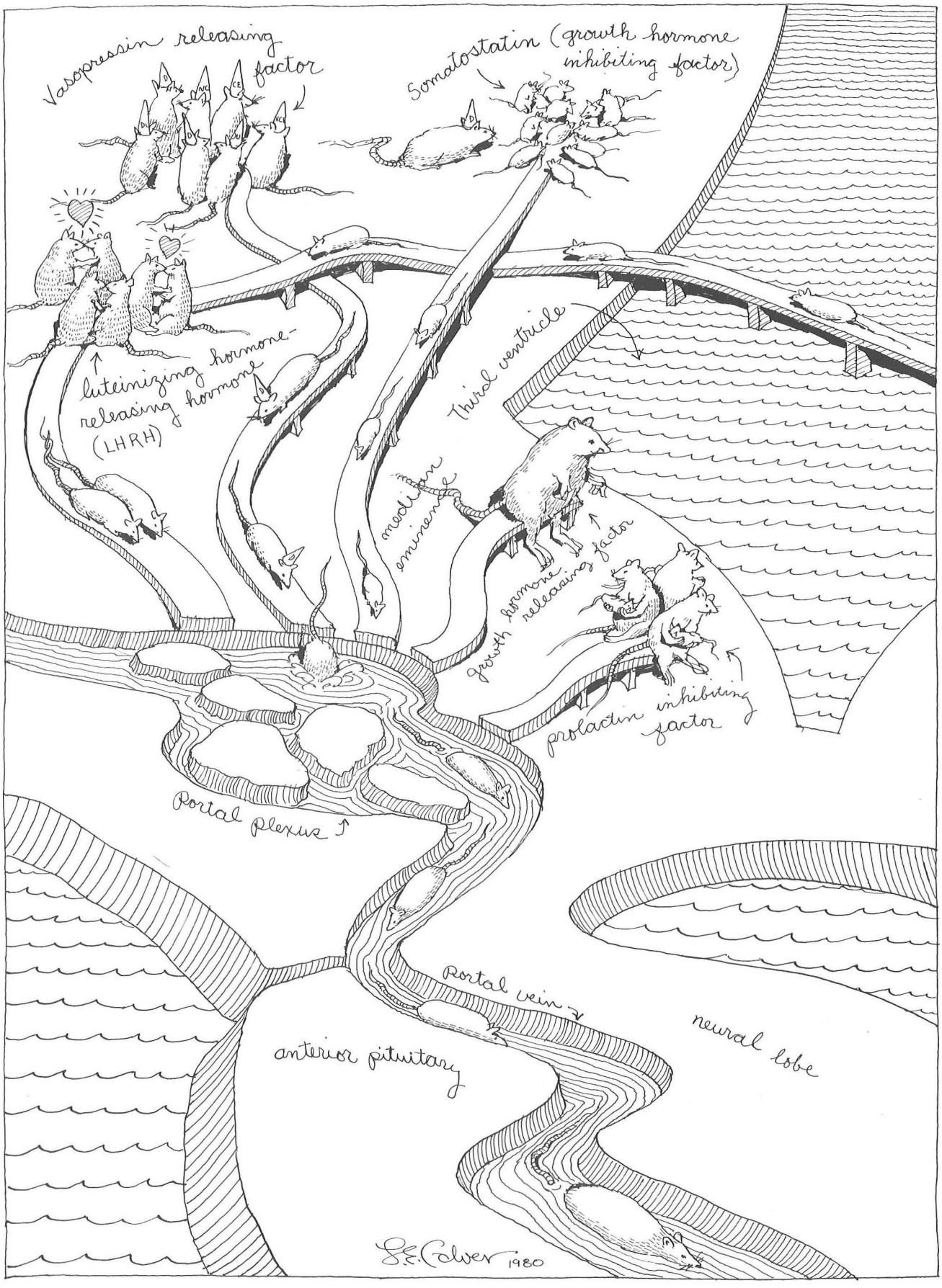
LHRH, the primary regulator of a group of hormones controlling sexual behavior and reproduction, is one of a group of chemical regulators under investigation by McCann's team. These chemicals are classified as "neuropeptides" (a peptide is composed of a chain of amino acids). Neuropeptides act in the brain as signal transmitters; by making contact with brain neurons the peptides either induce the neurons to release substances or they inhibit secretions by the neurons.

Twenty years ago knowledge of these regulators was scanty. Inquiry was first directed at the brain's pituitary gland, a pea-shaped gland located near the base of the brain and connected to the brain's hypothalamus directly above it by way of a thin, vessel-filled stalk. The pituitary, then known as the body's "master gland," secretes a family of hormones that regulate other glands and tissues in the body. But the mystery lay in how the pituitary was stimulated to secrete its hormones.

The missing "releasing factors" were found to be coming from the hypothalamus and other portions of the inner brain. And it didn't take long for scientists to realize that there were special "inhibiting factors" being



Dr. Ladislav Krulich (left) and Dr. Samuel McCann helped pioneer studies in neuroendocrinology, each with major discoveries to his credit.


Vasopressin releasing factor
Somatostatin (growth hormone inhibiting factor)
luteinizing hormone-releasing hormone (LHRH)
Third ventricle
median eminence
growth hormone releasing factor
prolactin inhibiting factor
Portal Plexus
Portal vein
anterior pituitary
neural lobe
S.E. Calver 1980

released from the brain as well.

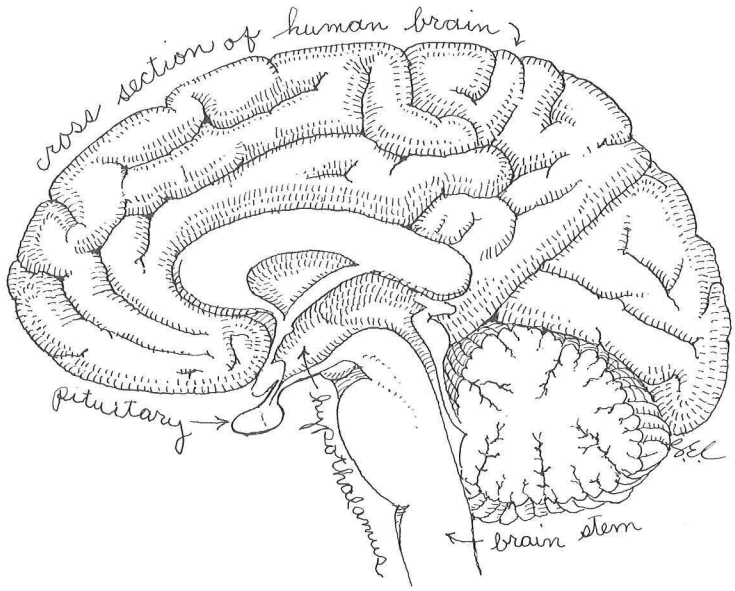
The 1960 LHRH discovery was of substantial importance to the medical community for a number of reasons. First, it reinforced the theory that there were releasing and inhibiting factors being produced in the brain's hypothalamus that regulated pituitary hormone release. Second, it gave further credence and respectability to the underlying basis of neuroendocrinology – that a neuron can secrete a substance like an ordinary gland. Third, it opened the door to understanding the actions of LHRH, which is perched at the apex of the chemicals governing the body's reproductive system in both male and female.

Also, the discovery was significant in helping reveal a bewildering chemical complexity at work in the brain based on synaptic transmitters and their mechanisms. Some of these substances have been found at work in numerous brain and body locations where they serve a multiplicity of roles. Apparently the roles are determined by the type tissue upon which the peptides act.

Indeed, the duplication of peptides in the brain and in other parts of the body has been one of the most intriguing finds of the last two decades. Some of the peptides secreted in infinitesimal amounts by brain nerve cells were first identified as hormones secreted by the pituitary gland, or as local hormones in the gastrointestinal tract. It's evident that the identical peptide can be secreted from different kinds of body tissues and provide completely different functions – as neurotransmitters, gastrointestinal transmitters and as local hormones. McCann predicts that all biologically active peptides throughout the body will someday be found at work in the brain. And, as if to support this theory, there is recent evidence that the brain contains even the two pancreatic peptides, insulin and glucagon.

In the brain and elsewhere each of the chemical regulators has its own characteristic excitatory or inhibitory effect. But part of the difficulty in defining the function of these substances is that they often work in combination with each other, forming tightly integrated, finely tuned systems for accomplishing various tasks.

McCann says the research team's basic goal is in clarifying the role of peptides at both the hypothalamic and pituitary levels. "We were initially



interested in releasing factors, but now we're interested in the role of all brain peptides. Some of these may be the missing releasing factors we've been looking for."

When McCann made his LHRH discovery there were only a few known neurotransmitters. Now the number of known or suspected transmitters has jumped to more than 30. New methodology has made a vast difference in the ability of scientists to isolate substances. And much of the credit for today's rapid rate of discovery can be given to a test for detecting minute quantities of a substance. The test, called "radioimmunoassay," involves a series of maneuvers in which substances within the brain tissue of laboratory animals separate by molecular weight as they fall through tall glass columns of gel. The heaviest substances fall first and so on. Once the tissue has divided into liquid layers within the gel, specific extracts can be siphoned off and examined.

And once substances are tediously isolated, researchers can begin the arduous task of clarifying the roles of the isolated substances.

Neuroendocrinologists within Southwestern's Physiology Department are among the leaders in taking this giant leap forward in brain research. Their accomplishments, both past and present, have given them worldwide recognition. And Southwestern has more specialists working in this area than any other place in the world, says McCann, who was the 1979 recipient of the Fred Conrad Koch Award, the highest honor of The Endocrine Society.

Dr. Ladislav Krulich discovered the first minute quantities of somatostatin in his health science center laboratory. Somatostatin was originally identified as "growth hormone inhibiting factor" since one of its functions is to inhibit the release of growth hormone from the pituitary. It's now known that somatostatin has widespread action and plays a generally inhibiting role in the central nervous system as well as in the pancreas, where it works along with insulin and glucagon to balance body glucose. In the brain it works in combination with other peptides to suppress the urge for eating and drinking. It also works in the brain as a sedative – perhaps to be used clinically someday for calming a manic mental state.

Dr. Robert Moss has done behavioral studies of the effects of LHRH on men with secondary impotence (that is, their sexual activity has been hindered by psychological factors, primarily from job-related stress). His work confirmed in humans what had already been demonstrated at Southwestern in animals – that LHRH spurs sexual activity and has a profound effect on mating behavior. Planning more experimentation in the future, his initial studies have detected an increase in libido and sexual contact in 60 percent of the men taking LHRH. And it seems that a depressed sexual appetite could be a sign of a shortage of LHRH in the body.

LHRH analogs (similarly structured chemicals), already being marketed in Europe for diagnostic purposes, are being produced for their therapeutic value. Pharmaceutical companies are also experimenting with drug antagonists that block LHRH

effects, potentially for use as once-a-month birth control pills. Besides the therapeutic possibilities of LHRH in human sexuality, it's being looked to as a means of fertility control in animal husbandry.

Dr. John Moltz, now a faculty member, discovered two new hypothalamic peptides while working as a graduate student here with faculty advisor Dr. Fawcett. The two unnamed substances have been found to cause an inhibition of insulin and an increase of glucagon release when tested on pancreatic islets. This may hold a key to future control of diabetes. Moltz is now in the process of obtaining enough of the substances from laboratory animals to reveal the nature of the molecules.

Dr. Sergio Ojeda has found that two pituitary hormones, growth hormone and prolactin, may regulate the onset of puberty in the female rat. (Puberty refers to release of the first egg by the ovaries.) He and co-workers have demonstrated with animal studies that there is delayed puberty when normal levels of prolactin and growth hormone are decreased. And if the two hormones are increased, there is advanced puberty.

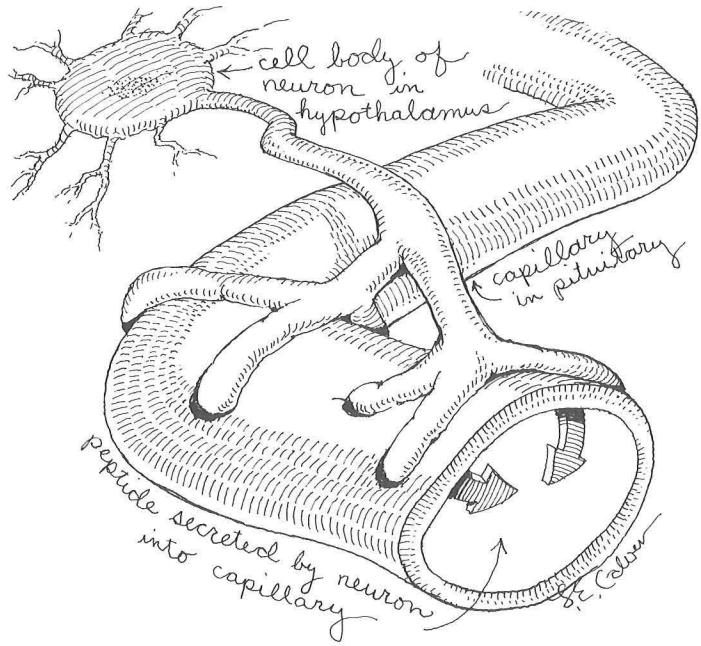
Dr. Andres Negro-Vilar has found that animals that are genetically hypertensive have abnormal distribution of two hypothalamic peptides – vasopressin and somatostatin. This is particularly true after submitting the animals to stress. His studies may provide important clues concerning the involvement of brain peptides in the development of hypertension.

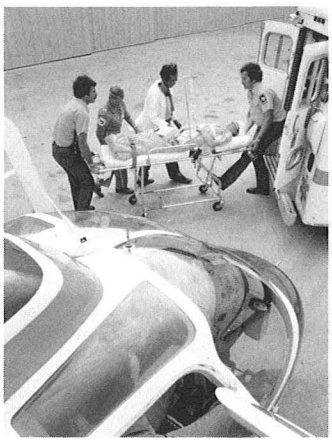
Vasopressin, being observed by Negro-Vilar and others in the group, is known as the antidiuretic hormone (ADH) since it controls the body's water excretion. It also seems to have effects on increasing memory and shows great promise for improvement of memory in humans.

Results from research at Southwestern and other laboratories suggest that imbalances in pituitary and hypothalamic peptides may underlie symptoms in a host of disorders. They range from types of mental illness (such as schizophrenia and depression) to sexual impotence, obesity, diabetes, epilepsy and many other human conditions. McCann and colleagues point to this as the practical, clinical side of neuroendocrinology, where future benefits reveal themselves.

Once more is learned about brain peptides they may be clinically utilized to rectify imbalances. Selective action analogs, which may be hundreds of times more potent than the peptides they imitate, may be tailor-made to provide beneficial effects – since injections of pure, natural peptides often bring on harmful side effects. And laboratories are currently experimenting with peptide antagonists, produced to block peptide effects.

All is still in the research stage. And scientists are seeing only the tip of the iceberg. But the overall, connecting picture is beginning to take form. •





Burn Trauma–body in crisis

BY ANN HARRELL

It was only seven years ago that the survival of an eight-year-old girl with 92 percent burns made medical history in a burn unit run by Southwestern Medical School at Parkland Hospital. Today, more and more people with massive burns are living because of the unit's pioneering research and treatment. And as a result, the highly respected Parkland Burn Center has become the largest such facility in the United States in terms of patient volume.

At the time the child was burned in an accident involving use of gasoline to scrub tar from her feet, no human had survived a major burn of that extent.

"We now understand and are putting into routine practice many of the things that were theory when she was injured," says Dr. Charles Baxter, adding, "Thank God, we were right on most of them."

Baxter, professor of surgery and head of the Parkland Burn Center, leads a team that has had a major role in developing burn treatment over a 20-year period. It was a period during which a serious burn over no more than half the body had been considered a death warrant.

What has changed? Better means of treating of burn shock and new approaches to nutrition have been developed and used effectively. (Burned persons may have up to four times more nutrition requirements than normal.)

Improved treatment also includes new ways of administering antibiotics, isolation of the patient in a special burn unit and early surgical removal of burned tissue. Parkland's team approach to burn care involves reconstructive surgeons, physical and occupational therapists, psychologists and social workers.

But probably the single biggest factor in burn survival today is use of human skin as a protective covering for large wounds. This is one of the reasons the eight-year-old survived.

"In the couple of years before her case, we had been able to bring four or five patients to the point of survival. But we couldn't get the vital homograft (human skin), so we lost them," said Baxter.

Because the Dallas Skin Bank was established just two months before the eight-year-old was burned, hers was the first case of this magnitude to call on its resources.

Today the girl is a pretty teen-ager and the skin bank has grown, too.

Working in cooperation with the Lions Eye Bank and other donor programs, the Dallas Skin bank now routinely receives between one-third and one-half the donor gifts in the United States. The Dallas Bank, which received 228 donations last year, has become the first facility in the nation able to supply skin to other centers on emergency request basis.

Still researchers say the amount is vastly inadequate and they are pushing studies in improved freezing techniques and investigation of more efficient storage solutions in order to stretch the supply, says Ellen Heck, faculty associate and transplant coordinator.

As guiding influence for the medical school's outstanding burn team since 1961, Baxter has been able to engineer not only regional logistical operations including air lift delivery to the center, but national recognition for burn research. He still takes a personal interest in the patients who have undergone the personal shock of a large burn:

* Connie Berg, a senior in college, was injured in an accident in her organic chemistry lab. Definitely a "people person," she was already having doubts about her medical technology major. The burn gave Berg more time to decide what to do with her life. She went back to school as soon as she could and took a master's degree in hospital administration. "God said, 'Wait a minute, I've got plans for you, Connie,'" she says. "If it hadn't been a big burn, I wouldn't have the oppor-

tunities to minister to other injured people, who seem to cross my path."

* Charles M. Dannheim, Clarksville farmer/rancher, was left without limbs after being burned by 7,800 volts of electricity from a dangling wire on his farm. Married only a month at the time, Dannheim was not expected to live, much less become the father of two sons. "I'm still as active as I ever was," he says with pride. "Shoot, I can even dress myself." Being as active as he ever was includes hiring out for horseback work and "running any piece of heavy equipment I ever saw." In addition, he loves to dance and has taken up a new sideline – selling his pen-and-pencil sketches of comic cowboy scenes.

* Pat Henderson, young, suburban housewife, was burned in an apartment fire. Being a fighter, she confronted Baxter angrily about "fixing up" patients and turning them out into the world unprepared for society's reaction. To her surprise and delight, the surgeon heard what she was saying. With his support she went on to found a recovering burns program, encouraging former patients to support each other in their adjustments. Henderson also appears with the Dallas burn team on many professional programs to encourage other hospitals to join what has become the recovering burns movement. In addition, she has launched a cosmetic business, manufacturing and selling cosmetics for scarred skin.

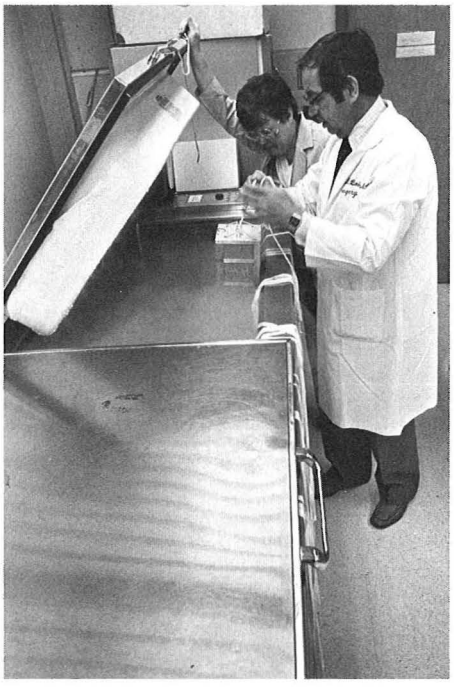
* David Ruth, a young businessman in his 30s when he was burned in September, 1978, reports to Physical Therapy daily at Parkland. Each session is both rigorous and painful. Not only was he badly burned, but Ruth has a severe hearing loss due to his medication. The fate of his hands, which were almost destroyed in a home explosion, causes him the most fear for the future. Does he ever wish he had died rather than face the slow hell of his rehabilitation? "To be honest, I think that every one of us does at some time or other," says the patient. "But I think I really wanted to live underneath. Those who don't, die." Not able to work, he spends much of his time doing volunteer work in the hospital X-ray department.

As the survivors have learned, a burn is the most traumatic injury the body can receive. A major burn injury causes a crisis in every organ system. The whole body reacts in crazy, out-of-control ways. The heartbeat speeds up; the metabolic rate goes on a rampage; the foot soldiers of the immune system rush out to defend the wounds from invading bacteria while leaving the rear unguarded; and fluids pour around the burn injury, evaporating and causing dehydration to the rest of the body.

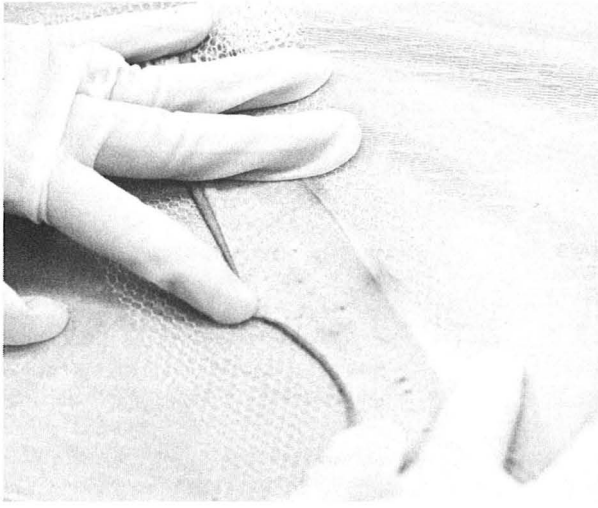
One of the weird things about a burn is that it may not necessarily look bad. The burned area may be only slightly pink or red and if the burn is deep, the victim, who is also in shock, may feel no pain because the nerve centers in the injured area have been destroyed.

Just what is a bad burn? According to the American Burn Association, sunburn is a good example of a burn classified "first-degree." While it may be red and even painful, the first-degree burn is not serious and can be treated by simple first-aid techniques. A second-degree burn, however, *is* serious. It can destroy the cells and lead to scarring but may have the capability of some regeneration. A third-degree burn generally does not have the capability of regeneration and requires surgical excision and grafting. If left untreated, a second-degree burn can progress to the third-degree stage.

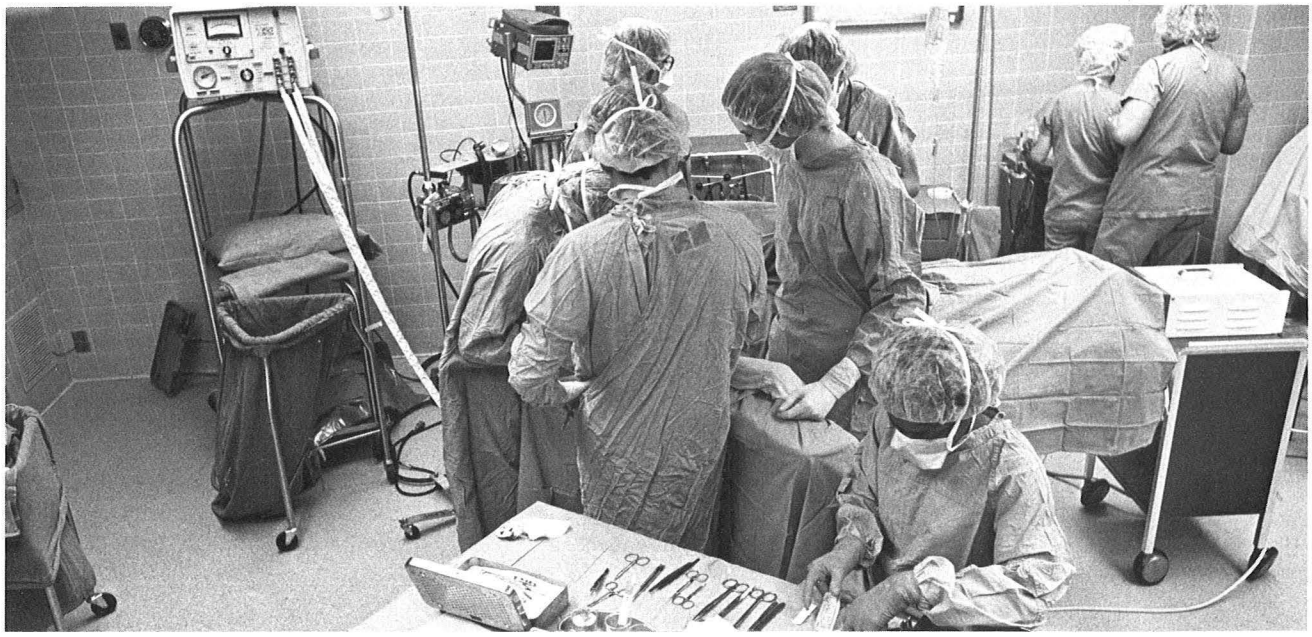
When the burn patient arrives at the hospital, the team must act quickly – determining the extent of injury, maintaining an open airway, bathing the wounds and, most important, giving massive amounts of fluid immediately.



Dr. Charles Baxter and research associate Ellen Heck remove human skin from the freezer.



Dr. Ron Sato rolls out skin to be transplanted as a living bandage.



Burn surgery is a team effort.

The degree of burns and the amount of body surface area burned help the physician decide on immediate treatment.

A major problem is smoke inhalation. While all burns may cause swelling of the vocal cords with airway obstruction, the inhalation of smoke and gases results in lung damage, which is often fatal to the patient. Thus, medical personnel rush quickly to prevent airway obstruction by the use of endotracheal tubes or tracheotomies.

The wounds are bathed to remove loose skin and debris as soon as possible so that topical antibiotics can be applied.

But most important, stresses Baxter, is immediate fluid resuscitation. Massive amounts of fluid are administered for burns 20 percent and over in small children, the elderly and patients with severe chronic problems such as diabetes and heart disease.

A Parkland study showed that 54 patients out of 1,000 died of burn shock within the first 10 days. Most of these were transfers who had not had immediate fluid resuscitation. Delaying these large doses of fluid is particularly dangerous in cases of children. "The kids are screaming, and it's hard to find their veins. Too often doctors give up and transfer them to us without resuscitating them. They just don't make it."

The "Parkland formula" for fluid resuscitation, worked out by Baxter and "recommended from experiments and experiences," has now been accepted by two-thirds of the major burn hospitals in the country. The formula consists of giving lactated Ringer's solution for 24 hours to the patient with a serious burn. Ringer's is chosen over blood plasma at this point because the body in shock can't retain the plasma, which is leaking from the damaged cells. However, the sodium chloride/biocarbonate balance is the same in both Ringer's and plasma.

In most cases, plasma can be given to the patient in about 24 hours since the capillaries will have sealed and the sodium level approached normal. Other signs that show the patient is doing well are a return to near-normal levels for cardiac output, rectal temperature and the amount of oxygen in the blood stream.

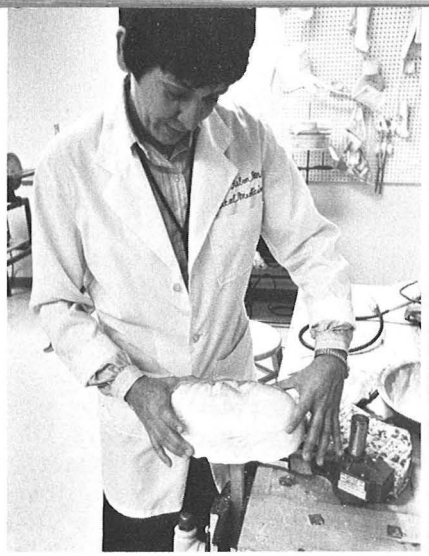
For pain, the Dallas burn unit primarily uses cool cloths and topical medication. Heavy doses of morphine are no longer given because the drug not only is addictive, but also depresses the heart and circulaton. This is already a problem for the burn patient.

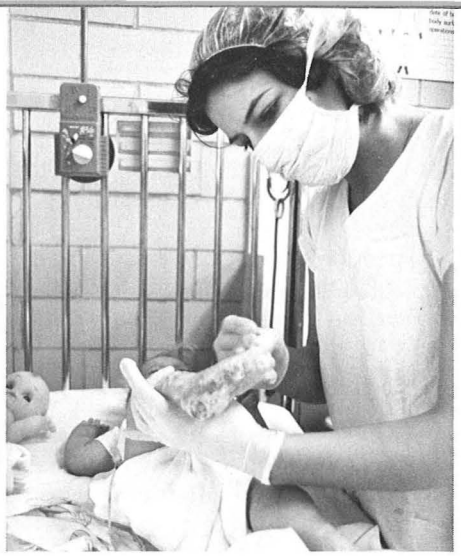
One reason that patients, particularly the elderly, don't make it is failure of their hearts to return to normal function. No one knows why, but in burns the whole metabolic system takes off like a runaway train. The body speeds up production of a metabolic factor in the blood that is needed for proper circulation. In the burn patient, this factor acts as a depressant on the heart. Sometimes normal function never returns.

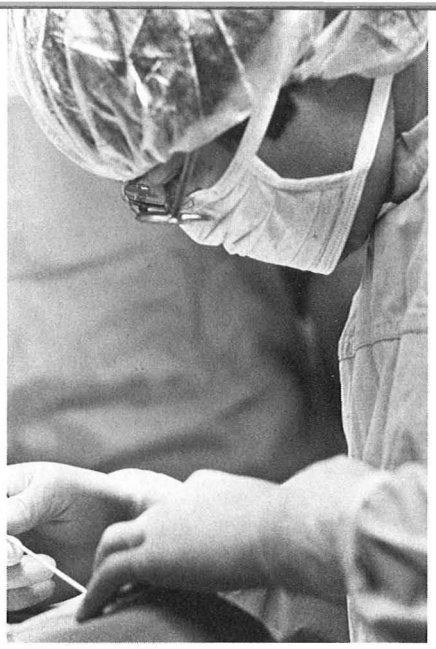
On the other hand, if the body recovers from the action of this myocardial depressant, the heart may speed up as much as two-and-a-half times its normal rate in order to deliver the oxygen required by the still out-of-control metabolism.

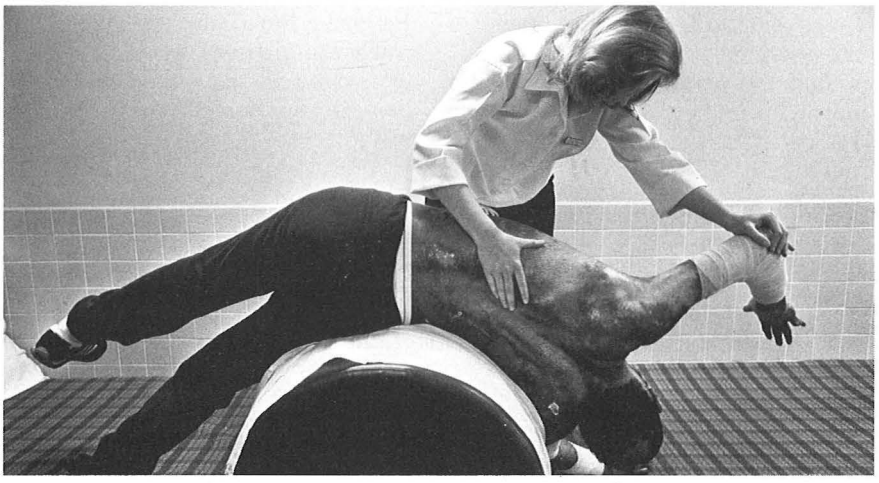
If this happens, the burn team often turns for additional information to an innovative heart-scanning technique developed by fellow faculty members Drs. Frederick Bonte, Robert Parkey and Ernest Stokely in the Department of Radiology. The technique, which shows the exact area of damage caused by a coronary, can also show how the heart is functioning, what the contraction and ejection rates are and how they can be used as a resuscitation guide. This test is also used by the burn team to determine the amount of muscle damage in many parts of the body in cases of electrical burns. In studies under the direction of Dr. John Hunt, new approaches such as this are being used to assess the deep muscle damage associated with electrical injury.

The most frequent cause of death for burn patients, however, is infection. Baxter says infection may be only a symptom of an overall biochemical trauma that usually manifests itself after the first 24 hours. Some of these factors, many yet unknown, may set up the climate for infection in the burn patient, where "the bugs walk in and do their dirty work." One of these









Top Left: Dr. Phala Helm examines the mold for a scar-flattening mask for a patient.

Top Center: Cleansing the wounds thoroughly and removing dead skin is an important part of treatment in the burn unit.

Top Right: Dr. Ron Sato, reconstructive surgeon, is included in treatment from the first.

Left: Painful but necessary are the stretching exercises this Parkland patient must face daily.

problems is primarily nutrition based, involving the interaction between water and fat-soluble vitamins, the metabolism of lipids (fats in the blood, such as cholesterol) and all kinds of little-understood relationships among the trace metals. At this point Baxter, the clinician, is collaborating with several scientists.

Basic scientists are doing red- and white-cell investigations that Baxter hopes will lead the way to further clinical applications.

Besides the gains in lives saved through fluid resuscitation, skin banking and, ultimately, laboratory research, the UT team is also pioneering in surgery, rehabilitation and pain management programs.

Dr. Ronald Sato, reconstructive surgeon on the burn team, says that it is unusual for the reconstructive surgeon to be in on the case from the very beginning. However, he feels that the patient profits from this approach, as does the physician. Besides getting to know the patient on a personal basis, Sato is in on the early cutting away of the dead tissue in the wounds, a technique pioneered by Baxter. "The early excision and grafting makes my job easier because there is less stiffening and less scar formation." A good example is the hand, which does not have a chance to ball up into painful contractures if surgery is performed early. Hospitals in other parts of the country report many more crippled hands than at Parkland's burn unit.

Reconstruction includes not only skin grafting, that is, using a patient's own skin or donor tissue as a covering, but other procedures as well. In grafting skin flaps, the skin is rotated from one part of the patient's body and moved to cover a nearby area. Skin and sometimes even muscle are used in order to give more functional results. Sometimes microvascular surgery, transferring a portion of one part of the body to another using very small needles and instruments, is necessary.

Sato believes in beginning the reconstruction process very early in order to gain maximum function as quickly as possible. Surgery involving cosmetic considerations follows in about a year.

The surgeon also champions the total rehabilitation program that the burn team offers to the patient. This includes classes for the patient and the whole family, the Recovering Burns group and referrals to skin care centers for further care and even advice on makeup.

Sato himself takes a very personal approach. He sees patients in his office on Saturdays so the whole family can come in and ask questions. He will not, however, allow self-pity. "My work in the operating room is only 50 percent – the other 50 percent is the patient's responsibility. If I operate on a stiff hand, that hand will remain stiff until the patient uses it."

Working along with Sato and the patient to see the hand doesn't remain stiff is Dr. Phala Helm and her staff. Helm, herself a former physical therapist, is head of the Department of Physical Therapy and Rehabilitation and an important part of the burn team.

"Our physical therapy program begins on 'day one,'" says Helm. Within the first 24 hours in the hospital, the patient has been evaluated, goals set and treatment begun. Weekly rounds check on the patient's progress and re-evaluations are made. But at all times the patient is totally involved and working toward taking over the responsibility for therapy later.

Helm's staff is known nationally for

its innovative work in rehabilitation. Highly trained occupational therapists design and make their own splints. They also make custom elastic garments, which staff members developed, to flatten scar tissue. And the outstanding hot paraffin and mineral oil technique for softening tissue for prolonged stretching was also a "first" for Helm's team.

A new program, originally funded by the Crystal Charity Ball and continuing through a donation from the Children's Foundation of the Episcopal Diocese of Dallas is for pain management in the pediatric burn intensive care unit. The training sessions, using tape-recorded relaxation exercises for children and tapes with maternal heartbeats for babies are aimed at decreasing discomfort and improving the quality of rest, which is vital to the healing process. Older children may use biofeedback equipment and pictures illustrating what treatment is doing to heal their bodies. Drs. Jeanne Achterberg and Fred Cromes, psychologists heading up the program, are teaching nurses in the unit to use the techniques with their patients.

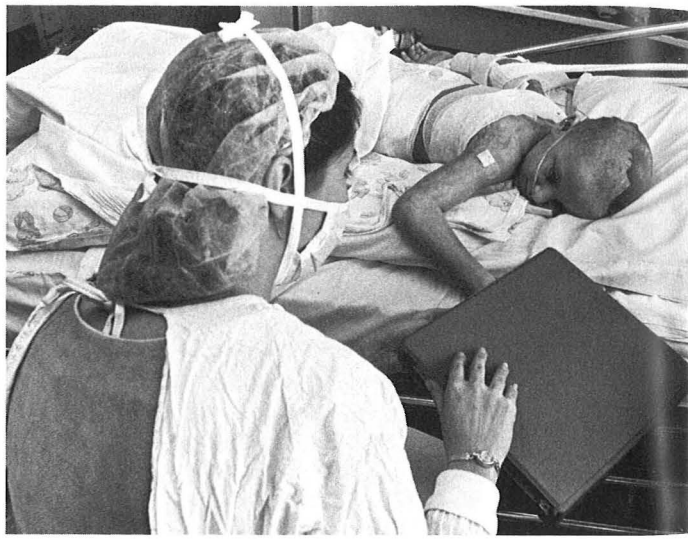
Helm believes the successes in the rehabilitation department, which has a remarkably low turnover, have been due to the dedication of her staff members. "They really take a pride in being *good*."

In fact, the whole burn team, from the faculty to the specialty nurses in the unit to the surgery residents on burn rotation, want to be the best that they can be – that's how lives are saved and the best possible quality of life obtained.

And the team's impact is felt far beyond the borders of the county Parkland serves. Because of the reputation of Baxter and his team, who are now saving 90 percent of their seriously burned patients, many team members present papers at important surgery, psychology and burn nurse meetings. Patients are brought in almost daily from areas in Texas served by a federally funded burn "hot-line," run by the burn service. This service provides consultation and teaching programs over a large part of Texas, as well as accepting the transfer of badly burned victims from areas where the highly specialized care necessary is not available. As well as using helicopter lifts for burn patients from nearby areas, burn personnel now work with Alpha Aviation, a jet-charter service that transports burn victims primarily from Texas and surrounding states to Parkland. Burn nurses and physicians travel with patients, who are receiving intensive care via a medical module designed by the staff. The service now has international capabilities.

All these advances in patient care, research and resources are the reasons that miracles happen every day at Parkland Hospital. •

Specially trained physical therapists help each patient with individual goals.



The nurse aids this child through biofeedback. A book of "healing pictures" helps him visualize what is happening in his body.

Biochemists study 'fast-forward' systems of burn patients

While the burn team is making major advances in treatment, Dr. Charles Baxter looks to still further improvements as a result of research on the patient's abnormal metabolism and immune system.

Biochemists Dr. Larry Cottam and Dr. Richard Harris are focusing on the altered lipid metabolism, associated with the abnormally short life of the red blood cells. In the burn patient these cells live only about one-third as long as normal red blood cells. This aberration results in the severe anemia routinely seen after extensive burn injury.

Although these patients have an extremely high ratio of free fatty acids to albumin in their plasma, they have a deficiency in essential dietary fatty acids and high density lipoproteins. The reason for this paradox is not completely understood, but it is known that this imbalance causes severe problems for the patient. While the scientists are looking into the causes for these excesses and deficiencies, they are also working toward a variety of possible nutritional therapies leading to the correction of these lipid abnormalities.

One approach being studied is the administration of carnitine, a protein usually obtained by eating meat in a normal diet. Carnitine is important for maintaining a normal fatty-acid metabolism.

Another nutritional deficiency being investigated by Cottam and Harris is the low content of fat-soluble vitamins in the burn patient. A proper concentration of these vitamins, while essential to everyone, is especially important to the burn victim. Vitamin A plays a big role in the healing of wounds, while vitamin E is an important anti-oxidant, which also acts in conjunction with the polyunsaturated fatty acids in maintaining a proper nutritional balance in the body. Also, vitamin K is an important element in blood-clotting activity, a function vital to the burn victim whose loss of plasma from the cells is a major problem. Studies are going on to monitor the level of these vitamins in burned patients in order to adequately supplement them in the patient's diet.

These biochemists are now looking at the possibility of adding safflower oil in addition to other fats already being used in intravenous feedings. Feedings by tube are essential to supplement the high-calorie diets burn patients must eat to try to keep up with their escalated metabolism. For example, it may be necessary for an active adult male to consume as many as 8,000 calories a day in order to compensate for this caloric loss.

Equally important to the metabolic studies are the white-cell studies also going on in the Biochemistry Department. Dr. Michio Nakamura, leukocyte expert from Japan, was brought to the health science center by Dr. Bettie Sue Masters to do research in this area. Working with Baxter, Masters and their staffs on a joint research grant, Dr. Richard Okita and Nakamura are looking for answers to what goes wrong with the immune system when there is burn trauma. These researchers also feel that evidence points to the patient's own plasma, as is the case with the red-cell studies.

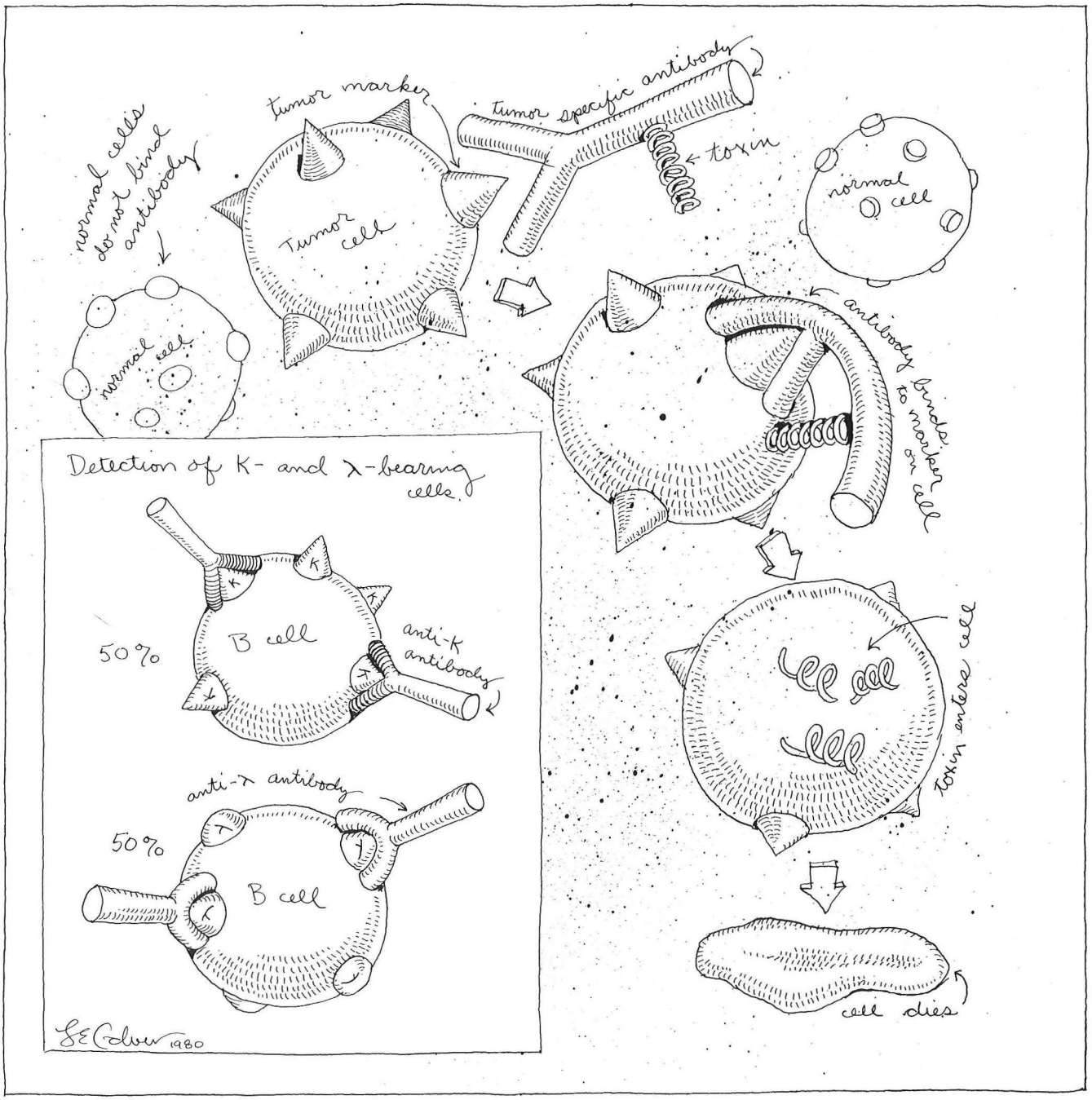
The burn patient, Masters explains, requires unbelievable amounts of antibiotics to fight infection. If the leukocytes, the foot soldiers of the immune system, don't mount a strong enough attack, the next line of defense is the lymphocytes, which are responsible for the production of antibodies. Often they, too, are inadequate to the challenge.

"This is an unknown area," Masters explains. "We don't know if the patients are getting the mobilization of leukocytes they need or if the wound is just too massive for them to handle. Perhaps the problem lies in the burn patient's attracting mechanism that is supposed to sound the alarm and summon the leukocytes to the wound. What we want to do is mount the invasion rather than give large doses of antibiotics. That's why we're looking at all the lines of defense." •

Ann Harrell

Molecular missiles and magic markers—tomorrow's weapons against cancer

BY SUSAN WILSON



Someday soon, physicians may be using a machine that can analyze a blood sample taken during a routine physical examination to "see" if there are cancer cells in the blood stream.

And to treat the cancer, they'll be using a type of "guided missile" drug therapy that can zero in on and destroy cancer cells while leaving normal cells unharmed.

It's not as futuristic as it sounds.

In the Cancer Center at the health science center, a team of physicians and immunologists are exploring new avenues in the detection, treatment and characterization of several types of the disease. They've already developed a blood test designed to monitor the progress of one type of cancer of the lymph system. And the procedure may eventually allow doctors to detect the presence of this lymphoid cancer in its earliest stages.

Though it is still in the test tube stage, the researchers are also developing a method of coupling a toxin or drug to an antibody in such a way that the chemotherapy treatment for cancer will destroy only cancer cells. The devastating side effects of cancer drug therapy may be avoided if the technique proves successful.

Cancer is a disease that touches the life of almost everyone. Each year in this country cancer claims more than 400,000 victims and strikes nearly a million more.

Quiet battles against this disease are being fought in numerous research laboratories as scientists search for weapons that may someday lead to a decisive victory over cancer.

The Cancer Center investigations are focused on B cell tumors, a type of solid tumor of the lymph nodes. Normal B cells are part of the body's immune system. When the body is attacked by a virus or bacteria, the B cells respond by producing antibodies that recognize and stage a counterattack against these foreign invaders. But when, for whatever reason, a B cell becomes malignant, its reproductive mechanisms go berserk. It spews forth exact duplicates of itself in an uncontrollable fashion, fooling the body's immune system into complacency. Failing to recognize the aberrant cells as the "enemy," the immune system ignores the proliferating mass.

Undetected, the tumor mass continues to grow in the unsuspecting host. Not until it has reached considerable size will it be detected as a lump. And only then is the counterattack launched as science responds with its limited arsenal. Often, it's too late.

Even when the cancer seems to be "cured" or to go into a state of remission following treatment – usually surgery, radiation, chemotherapy or some combination of the three – the cancer frequently comes back with a vengeance. Often the patient fails to respond on the second round of treatment, and another cancer death is added to the growing number of statistics.

So being able to precisely monitor the course of the disease is vital. Immunologist Dr. Ellen Vitetta, a member of the Cancer Center team, explains: "The earlier you treat the malignancy, the better the chances of killing the tumor. But you want to avoid overtreatment with toxic drugs that kill not only the malignant cells but the normal, healthy cells as well. You want to have the treatment parallel the disease."

Conventional methods of examining blood cells usually can't distinguish between normal and malignant cells. But the Cancer Center's new blood test seems to work. "We've found that in many cases we can almost predict the remission or recurrence of lymphoid tumors when we test the blood samples from patients with known lymphoid cancers," says Vitetta. "It's sort of a barometer of the patient's condition. When the physician sees that the patient is doing well, we're seeing a parallel to that in the blood samples. When the patient is doing poorly, that's also reflected."

Vitetta is one of six principal investigators working on a five-year project funded by the National Cancer Institute. Other investigators include Cancer Center director Dr. Eugene Frenkel, a clinical hematologist; Dr. Graham Smith, an oncologist (tumor specialist); molecular immunologist Dr. Jonathan Uhr and cellular immunologists Drs. Jack Kettman and James Forman.

The blood test the team has devised takes advantage of several unique characteristics of the B cell. Every B cell has one of two types of surface "markers" – Kappa or Lambda. A marker is a molecule of a specific shape that accepts an antibody of a specific shape as a lock accepts a certain key. In every normal human about half the B cells have a Kappa marker; the other half have a Lambda marker – a one-to-one ratio of the two cell variations.

Also B cells are monoclonal. So when a malignant B cell reproduces, it reproduces cells identical to itself, either all Kappa or all Lambda. The malignant B cell, spewing out clones of itself at a prodigious rate, will alter the body's ratio of the two B cell variations. The blood test is designed to detect this altered ratio of Kappa to Lambda B cells, signaling the presence of a B cell tumor.

It works this way: The patient's blood sample is treated with antibodies tagged with a fluorescent dye. The antibodies are specific for either Kappa or Lambda markers. A sophisticated new research tool, the fluorescence-activated cell sorter (FACS) employs a laser beam that causes the surfaces of first the Kappa cells, then the Lambda cells to glow. These glowing cells can be analyzed and sorted according to the intensity of light.

If monoclonal malignant tumor cells have "leaked" into the blood stream, the body's normal one-to-one ratio will be altered. The FACS can detect a change of one percent or less in this ratio.

"It's as if you had a half dozen oranges and a half dozen apples and then added another orange. You could see the change in the ratio of oranges to apples. That's what the FACS does. It detects the change in the ratio of Kappa- to Lambda-bearing cells," explains Vitetta.

Currently, the group uses the FACS technique to screen various forms of B cell lymphoid cancers, in particular the solid tumor forms. They are still examining at what stage in the disease the blood test can diagnose the presence of these cancer cells. Must the cancer be in a well-developed stage before the tumor cells begin to leak into the blood, or can the disease be detected in its earliest stages? Only testing on a vast scale can answer this question.

As it now stands, the FACS blood screening can only be used on B cell tumors where antibodies against Kappa and Lambda markers are readily available. Other types of malignant tumor cells have as yet unidentified specific surface markers. Through a complex experimental process, the investigators hope to find antibodies specific for these other types of tumor cells as well.

A specific antibody will fit only one

site on a cell (a surface marker), much like pieces of a jigsaw puzzle fit together. The site, or marker, is like a fingerprint of the cell, characterizing its uniqueness among all cells.

The Cancer Center research team is looking for tumor-specific antibodies, other than B cell antibodies, that can be used with the FACS. They've zeroed in on breast tumors initially. Using a complex procedure developed in England to obtain monospecific antibodies, they have undertaken the tedious, often frustrating search for these specific antibodies.

"Nobody knows how many different kinds of breast cell specific markers there are," says Vitetta. "Right now we are just looking for the needle in the haystack – the breast cell tumor-specific antibody. I have no doubt the antibody is there; it's just a question of finding it."

Finding "it" means identifying the antibody that will fit the one marker out of hundreds on the cell surface that is not on any other type of cell – the fingerprint or "magic marker" that signals this is a tumor cell.

Uhr explains: "Any kind of tumor cell will have a variety of different markers on its surface and some of these markers are shared in common with other kinds of normal tissue. One marker may indicate that this cell is a human cell and is shared by all normal human cells. Another marker may be a little more restricted in that only normal human breast cells have it. Still another marker may be even more specific in that it is expressed only on a subset of cells. One marker is the 'magic marker' that signals this is a tumor cell. It is not on any other type of cell." They hope to find an antibody against the one surface marker that is common to all breast tumors, though each type of tumor may also have its specific marker.

The team spent a year learning how to carry out a hybridoma (hybrid tumor cells) process for growing cells that secrete monospecific antibodies. They are now using this to search for the "magic marker" for breast tumor cells.

"It's a question of sorting through hundreds and hundreds of samples until we find the one antibody that won't react with kidney or lung or white cells but will only react with breast tumor cells," Vitetta says. "There is an incredible amount of screening to be done. You have to use representative tissue of many different normal human tissues to screen every single antibody until you find the one that reacts with none of the others but only with the tumor cell. It's very slow. We spend weeks doing this screening, but at the end of a week, we may find that all the antibodies are negative. Then we have to start generating new hybridomas and testing them all over again."

But if the search is successful, their technique will be applied over and over again as this Cancer Center and others search out tumor-specific antibodies for hundreds of different kinds of cancers. "You do all this with a lot of faith," says Vitetta, "and hope that you will end up with something useful. If it turns out that these breast cell tumor cells *do* circulate in the bloodstream and we can pick them out using the FACS, it would be fantastic."

Early diagnosis of cancer is just part of the research going on here. Working with a group from Stanford University, the team has developed a mouse tumor "model" that is very similar to an extremely malignant type of chronic lymphocytic leukemia (CLL) found in humans. It's an important milestone in the diagnosis and treatment of this type of cancer because, for the first time, researchers have an animal model to study how the tumor grows, why it grows and how it can be treated.

"We can look at the growth of the tumor in the mouse, and we are now in the process of coupling an antibody to drugs to kill the tumor in the mouse – a sort of 'guided missile' for the tumor cells that will leave normal cells unaffected by the treatment," Vitetta says.

The idea of using antibodies coupled to drugs to kill cells isn't a new one. In theory it sounds simple, but in fact it has never worked very effectively. But, in eight months of trial and error they seem to have overcome the major hurdles, at least in the test tube.

The problems they've had to solve were enormous. A method had to be developed to prepare the antibody and then to couple the drug (or toxin) to the antibody without destroying either the antibody or the toxin activity.

A major problem they overcame was purifying the serum containing the antibody to eliminate all extraneous antibodies not tumor-specific. The remaining five to 10 percent of the antibodies are so specific and active that only a trace is needed to test on tumor cells in culture. The next step – months of testing on living animals – will be needed to see if the technique holds up.

The search for more effective ways to detect and treat cancer involves long and tedious procedures, and many researchers have a hand in the work. Dr. Ellen Vitetta works on purifying the antibodies needed for one phase of the project.

There are many questions yet to be answered about the process. Will the antibody-coupled toxin remain stable in animals and reach the target cell efficiently? If, in fact, it has a "guided missile" effect, what will happen to the drug when it reaches the tumor cell? Will it kill the malignant cell itself or be "gobbled up" and destroyed? Will the drug action stop with the tumor cell, or be "recycled" to act on normal cells? How much and how often to treat? The answers will be tediously worked out in the months and years ahead.

It's a time-consuming gamble, but one the researchers believe will ultimately pay off.

"I've always said the sign of a good scientist is someone who is not only undaunted in the face of constant failure, but is willing to take a gamble as well. You can find the answer the first day, or you may not find it for 10 years. You just don't know," says Vitetta. •

Other members of the Cancer Center research team include postdoctoral fellows Drs. Sally Anderson, Peter Isakson, Frances Ligler, Keith Krolick, Michael Muirhead and Dorothy Yuan. Research assistant Joyce Himes is responsible for the development and use of the FACS.

The Jerusalem Connection

Aside from her role as one of the principal researchers in the Cancer Center's immunology section, Ellen Vitetta finds herself chief travel agent for a colony of experimental mice. It's a role that challenges her patience almost as much as the long and frustrating weeks and months she spends on any given research project. Despite the difficulties, she's proud to say that 433 mice out of a total of 435 have made the trip between Jerusalem and Dallas safely.

The mice, which are injected with tumor cells and have developed massive spleens as a result, must be sent to the Hadassah Medical School in Israel for a highly specialized experimental treatment aimed at reducing the tumor load. No shipment of the furry little creatures has been without its perils and pitfalls. Nervous customs agents must be calmed. Hysterical phone calls from an airport somewhere in Greece where the mice have mysteriously landed must be dealt with. Will the PLO decide to hijack this El Al plane? Indeed, will the airline decide at the last moment to change the flight schedule of this particular plane?

You name it, it has either already happened or probably will.

"There are so many problems involved in shipping these mice," she explains. "They don't like extreme temperature shifts, so you have to consider the weather here and in Jerusalem before shipping them. As you know, in Texas this is next to impossible! We have special containers for cold and hot weather so they don't arrive at their destination either frozen or cooked."

She keeps a special Jewish calendar because, "It seems there is a holiday of some kind or another every other day, and you'd better make darn sure that our Texas mice are not going to arrive during one of these holidays because in Jerusalem, *everything* closes down for a religious holiday."

On the way back into the U.S., she says, you're almost certain to run afoul of the customs officials.

"I now know several customs inspectors in New York on a first-name basis," she insists. "And not one of them can get straight the difference between a rabbit, a mouse and a rat. I get strange calls that my 'Hebrew' rats have arrived, or that I have 'Hebrew' mice some place on the docks in New York."

One of the problems involved in the care and feeding of traveling mice is making sure they have an adequate food and water supply for the three- to five-day trip. Slices of apples or potatoes are commonly used to double as both a food and water source. When her Jerusalem counterparts sent a shipment of mice back to the U.S. with sliced potatoes, she spent the better part of two days on the phone to New York trying to salvage three months of research.

"A shipment had been sent from Jerusalem, and after a few days and no word I was beginning to wonder. I spent an hour and a half on the phone with the Dallas agents and then finally contacted the customs inspector on the dock at Kennedy Airport. He informed me that domestic airlines wouldn't accept the Israeli shipment of mice to Dallas because the shipping containers had dead mice in them. They wouldn't take a damaged shipment because they didn't want to be accused of animal abuse.

"So I said, 'Look, if you keep them on the dock for very long they're going to smell terrible.' They seemed undaunted by the importance of the experiment but could relate to the prospect of a bad smell. Only by the greatest control did I convince them that if the mice died there, they were going to stink up the place and it would make working conditions very unpleasant."

She offered to relieve the inspectors of the problem mice, and called colleagues at the Sloan-Kettering Institute in New York to come and get the mice from the airport. "'We got them,' they said when they called me back. I asked them how many of the mice were dead.

"'There's nothing dead,' they said. 'But there are a bunch of potatoes in here that look like dead mice.' All 50 of the mice were alive. But my colleague in Jerusalem had sliced the potatoes lengthwise, and you know a potato lying there lengthwise and kind of brown could look like a dead mouse – especially to a customs inspector who can't tell a rat from a mouse anyway."

Vitetta received the full shipment of mice two days later – minus the dead potatoes. •

Susan Wilson

**It wasn't a meltdown.
No reactor overheated and there wasn't any krypton gas
released into the atmosphere. But in 1957
there was a nuclear incident involving Southwestern Medical School.
It's a scary story, filled with intrigue, sex, danger
and the threat of an A-bomb on the loose.**

The Accident at Three Square Block Turtle Creek

By Ric Spiegel

"Doc, I hate to wake you at this hour, but I think we got an atomic bomb here."

Jack Krohmer, then director of the Radiation Safety Program at the health science center, rubbed his eyes and squinted at the bedside clock. One o'clock in the morning was no time for a practical joke.

The voice came back again.

"Doc, this is the fire department. You're the only one we know to call. Through the binoculars this thing looks dangerous and we're pretty scared here."

Within a minute Krohmer was on the phone again. While one foot struggled into a shoe, he waited for an equally sleepy Stan Hodges to answer. Hodges was a senior resident in radiology and a student of Krohmer's. They would need to confer. And if Krohmer had to go out on this unbelievable call, he wasn't going alone.

"Stan, I hate to wake you at this hour, but..."

The truck driver had never understood the nature of the Thing in the back of his pickup. It wasn't his job to know. The Thing looked dangerous all right, its yellow exterior emblazoned with purple "DANGER: RADIATION" symbols. Someone in the company probably knew what it was for, but he really didn't care.

Driving down Turtle Creek around midnight with his girlfriend by his side, he hadn't noticed the chuckhole in the street. The Thing in the back toppled over and out, crashing to the ground with a heavy thud.

"Goddammit!" He would have to pull over. And what if someone saw him? What if his wife found out?

Anonymity was the answer. He quickly drove to a phone booth and called the Dallas Fire Department. He told them about the Thing with its yellow exterior and purple warning symbols. He told them it was a Thing that was "kinda dangerous," and he told them where it was. Then he hung up and sped away with his honey by his side.

Stan Hodges couldn't believe it. Sure it was conceivable there was an A-weapon down around Turtle Creek. But it was so unlikely. International espionage hardly took place along the banks of Dallas' fashionable stream. While he waited for Krohmer to pick him up, he spoke with the fire department sergeant on the phone.

"Doc, it's about six or so across. Kind of oblong, nearly round, I guess."

Not exactly the kind of details a scientist usually deals with. But it *was* apparently made of lead, judging from the dent it put in the asphalt. And the way the fireman described the Thing from his binocular view, it really did sound ominous.

"Six across!" said Hodges. It was possible. Some small A-weapons were about six feet in diameter.

Krohmer was honking in front.

"Doc, it's about six or so across. Kind of oblong, nearly round, I guess."

Nobody on the fire department roster wanted to go near the Thing. The whole area – three square blocks – had been carefully and swiftly cordoned off by the police and firemen. Everywhere there were flashing lights, whirling beacons and yellow sawhorses with "DANGER" in red letters.

And the TV stations were on hand, looking for footage. Their large film cameras were each trying to catch it from a different angle: Who was the mysterious caller and where was he now? If the atomic bomb went off, how far back would everyone have to be? What does an A-bomb look like, anyway?

By now, one brave soul had decided three blocks was too far away to see anything. Using the experience from all those emergency training drills, the fireman made his way to a perch just a few yards from the Thing. Alone, he was at ground zero.

Carefully, Krohmer eased his long station wagon past the cautious guards, through the blockaded lines. It was the wildest scene he and Hodges had ever seen. Everywhere there were uniformed men. Turtle Creek, awakened by the commotion, clumped with curiosity, but not too close. What seemed now like more than a rumor began to circulate: Somewhere, out there in the dark of early morning at Turtle Creek, an atomic bomb had been lost, or *intentionally* placed.

The experts now joined the lone brave soul at ground zero. Krohmer, the senior expert, nationally known for his knowledge of the field, was armed with his Geiger counter. Hodges was by his side.

"Let me have a look, son," said Krohmer, taking the binoculars from the fireman. And for the second time that night he squinted in disbelief. The Thing was about six in diameter, but not six feet – six inches.

"Bomb, my ass!" muttered Krohmer.

Hodges grabbed the binoculars for a fast look and agreed. If the Thing was a bomb, it was manufactured by the Lilliputians.

Krohmer now held out the radiation detector and approached the Thing. Eight feet away: no clicking. Three feet: still no audible indication of radiation. Finally, close enough to sit on it, the Thing gave off only normal background emissions. The only possible danger from the mysterious object was a hernia from trying to lift it too fast.

Krohmer and Hodges didn't say much. Together they hoisted the lead ball with its threatening symbols into the back of the station wagon.

Driving slowly, they neared the corner of Turtle Creek and Lemmon Avenue. While the light was red, an enterprising cameraman stuck his lens inside the car window and caught a black and white glimpse of the Thing in the back. Then he swung the camera around, focused on Krohmer at the wheel and inquired about the destination of the Thing. Although they knew, Krohmer and Hodges still had not commented on the nature of the device.

"Why, we're taking it to Southwestern Medical School, of course," said Krohmer.

Much earlier than usual, Dean Atticus J. Gill's cane could be heard clicking down the hall leading past the Radiology Department. Krohmer heard it coming. It was not only much earlier than usual, but also approaching much faster than usual. Normally a quiet scholarly man, Dr. Gill had caught the early morning news, complete with film coverage of the "atomic bomb" that was taken to Southwestern Medical School; this morning he was a bit...perturbed.

After three days of press and television coverage, the A-bomb scare was over. The Thing – an extremely low-level radiographic source used to check industrial pipes – was recovered by the company.

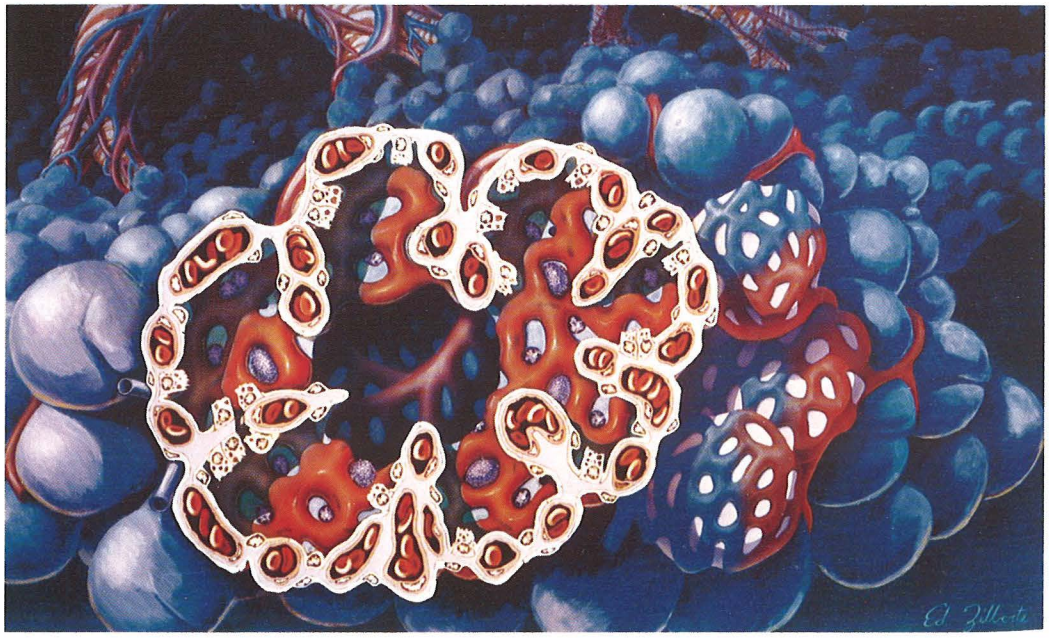
And somewhere, a truck driver would soon be without a job, maybe a wife. •

Medical Illustration:
Synergy of Art and Science

"Eyes of the Heart": commercial illustration in soft sculpture.

SUE BENNER:
'There are plenty of traditional illustrators. Soft sculpture is the art I do best and love. There is always an element of surprise when the pieces are finally put together.'

"Removal of Membrane from the Eye": surgical illustration in acrylic.



"Microanatomy of the Lung": acrylic.

ED ZILBERTS:
'What's important here is the opportunity to do conceptual work. It not only makes this kind of art creative and exciting, it also develops your imagination. Imagination is a key to drawing or painting things the size of cells or microscopic veins.'

Selling a concept visually, Lewis Calver believes, makes for one form of good communication. So Calver, director of Biomedical Illustration Studies in the Graduate School of Biomedical Sciences, stresses the conceptual approach to his students.

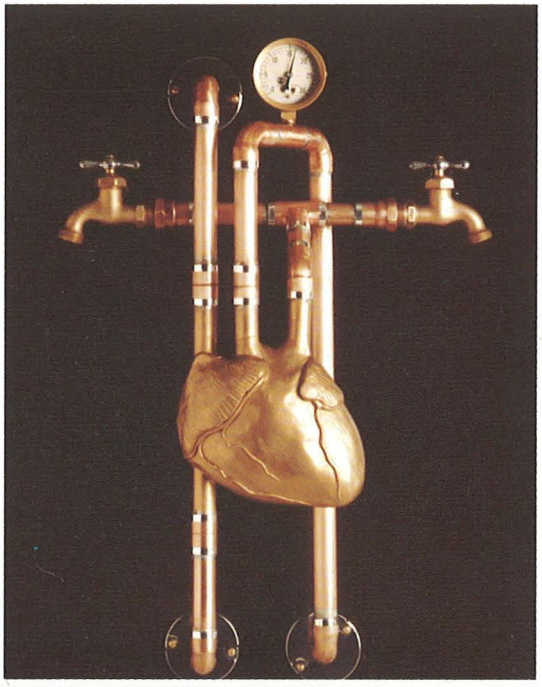
"Commercial illustration is a good example," he says. "There, you are trying to sell a product or an idea. If the illustration gets in the way of the message, then you've defeated your purpose."

Because of this approach to medical illustration education, as well as an award-winning faculty that consistently produces award-winning students, the health science center's Medical Illustration program is considered "the best in the nation." And that makes entry into the program highly competitive.

Each year, 100 or so students from colleges and universities apply for the six openings in the two-year program. Some 25 of these students are invited to the Dallas facility for interviews. But only six will make the final cut. And those six, Calver and his staff are determined, will be not only excellent illustrators, but good communicators as well.

The works of art shown here represent each of this year's graduates. ●

"Controlling Cardiac Output": commercial illustration, copper, brass and labstone.

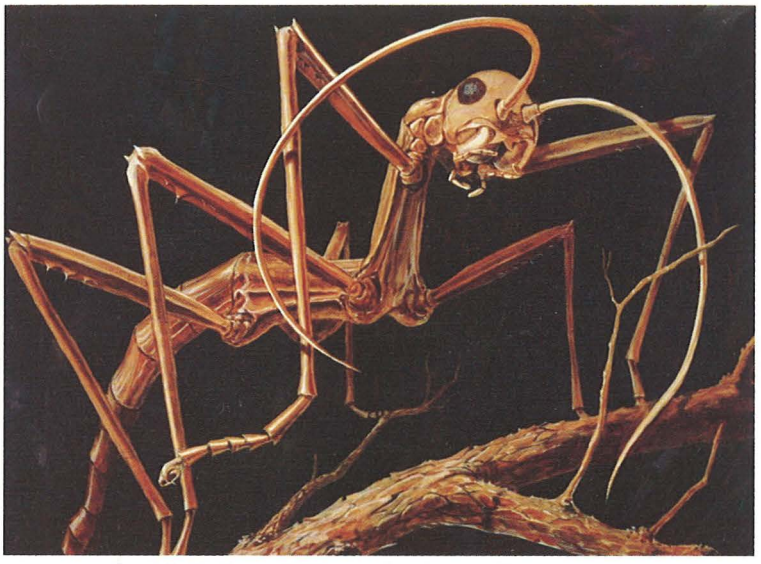


JOHN B. STOKES:

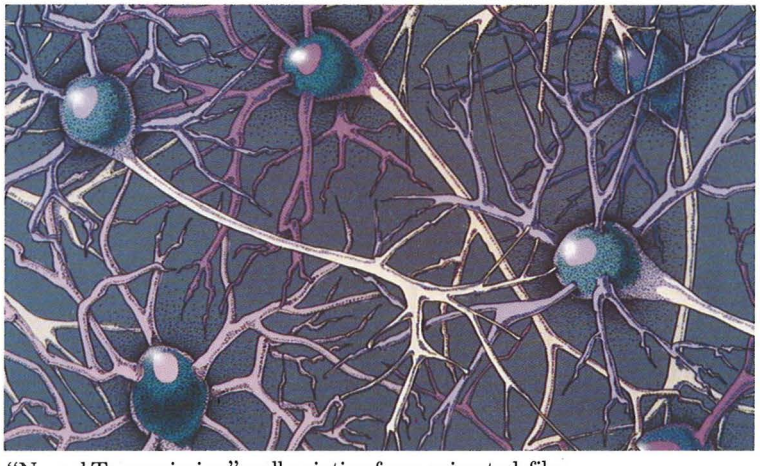
'If you're doing art in good faith, everything you do is an experiment. This program not only allows us to experiment, it insists upon it.'

WALTER STUART:

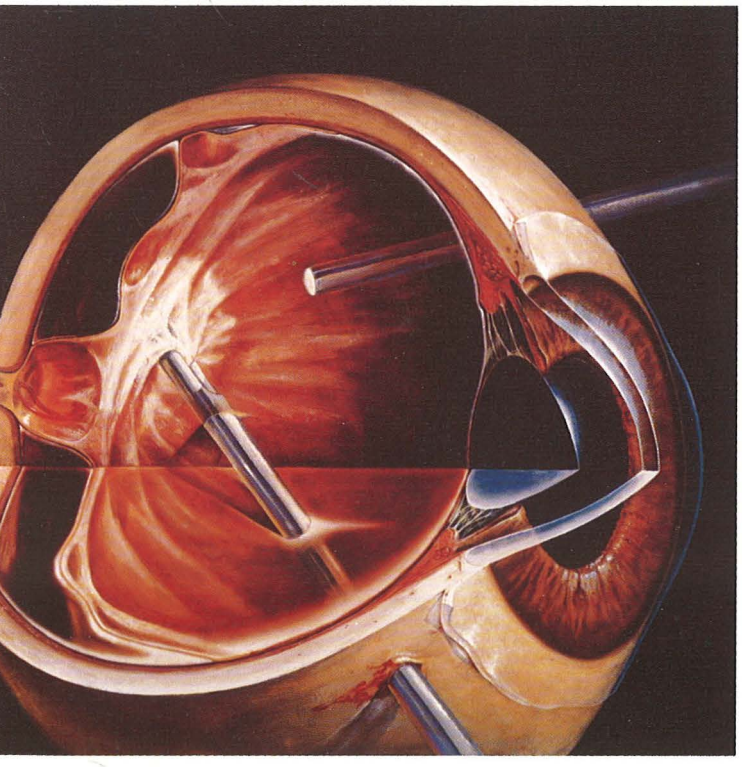
'I looked at each of the six schools in the country and realized this was the place to be. Here I've learned things like television techniques, slide presentations and even cell painting for animation.'



"Walking Stick": biological illustration in acrylic.



"Neural Transmission": cell painting from animated film.



BILL ANDREWS:

'The instructors here simply won't settle for typical student work. That kind of attitude really pulls the creativity out of you.'

RANDEE LADDEN:

'I like seeing my pictures move. That's why I like animation. It brings the unimaginable to life.'

Headstart for Melissa

Blind children benefit from early evaluation and teaching

BY ANN HARRELL

Melissa was a good baby. Except when she was stuffed up with the cold that had plagued her since birth, she could be easily comforted with a bottle. But the evening of her 30th day she suddenly started screaming and wouldn't stop.

Meningitis. That was the diagnosis given by the young doctor on duty at the local emergency room, a moonlighting resident from Children's Medical Center, pediatric teaching hospital for the medical school. "Lady, you'd better get your kid over to Children's quick," he said, picking up the phone to make arrangements for Melissa's admission.

"I'd never even heard of meningitis," says Helen Capps. But this inflammation of the membrane covering the brain and spinal cord left Melissa blind. The cause was damage to the optic nerves.

At Children's a whole team of physicians and nurses went to work to save the baby, by then in convulsion. The outlook was grim.

Melissa, however, survived the crisis and hung on.

The next day in the intensive care unit, the Capps family "celebrated" the baby's one-month birthday, not knowing whether she would live or die. But even when it looked like the baby would make it, the heartbreak was not over. On her 15th day in the hospital, the family learned Melissa was blind and had associated problems stemming from brain and nerve damage. (Melissa also has some hearing loss, as well as cerebral palsy.) As kindly as possible, the physicians told the family there was a good chance the baby would be little more than a "vegetable."

"I was very bitter," says the mother. "I couldn't help saying 'Why me?' I was angry, and I didn't want to be around any normal babies."

Fortunately, Melissa had a good neurologist, the mother reports. When she was six months old, the doctor referred Melissa to the University Affiliated Center (UAC), a program for consultant services and for training health professionals and teachers to work with handicapped children. The UAC, where Melissa was evaluated for physical and mental development, is a service unit of the health science center's Department of Pediatrics. Specialists there referred the family to The University of Texas at Dallas Callier Center for Communication Disorders, which runs an educational program for blind infants and small children in cooperation with Dallas and other neighboring school districts.

These referrals have made a big difference in the lives of both Melissa and her parents.

"I was frightened," the mother admits. "Melissa just lay there. She couldn't even roll over. We thought she was going to be a vegetable as the doctors had feared. But now we know she's not – thanks to the professionals and our faith in God."

One of these UAC professionals is Dr. Ed Hammer, specialist in education of blind and other handicapped children, who is also on the faculty at UTD. Hammer's background in education for cerebral palsy victims and other handicapped children is especially helpful since many blind children have more than one physical handicap.

In the widely used Callier-Azuza Test he developed, Hammer has adapted several major methods of evaluating normal stages of child development to testing the skills of blind infants and children. During the testing, it appears the psychologist is playing with the little ones with toys and flashlights. But each action is carefully calculated to reveal the extent of vision, hand-to-mouth coordination, speech, understanding concepts and other important developmental skills.

After the assessment is complete, Hammer and his team of childhood specialists, who help in the evaluation at the UAC, meet with the parents and teachers to plan an individualized program for the child. The parents are always the obvious place to start the evaluation, Hammer explains, because they are with the child most of the time and are paying attention to his or her behavior.

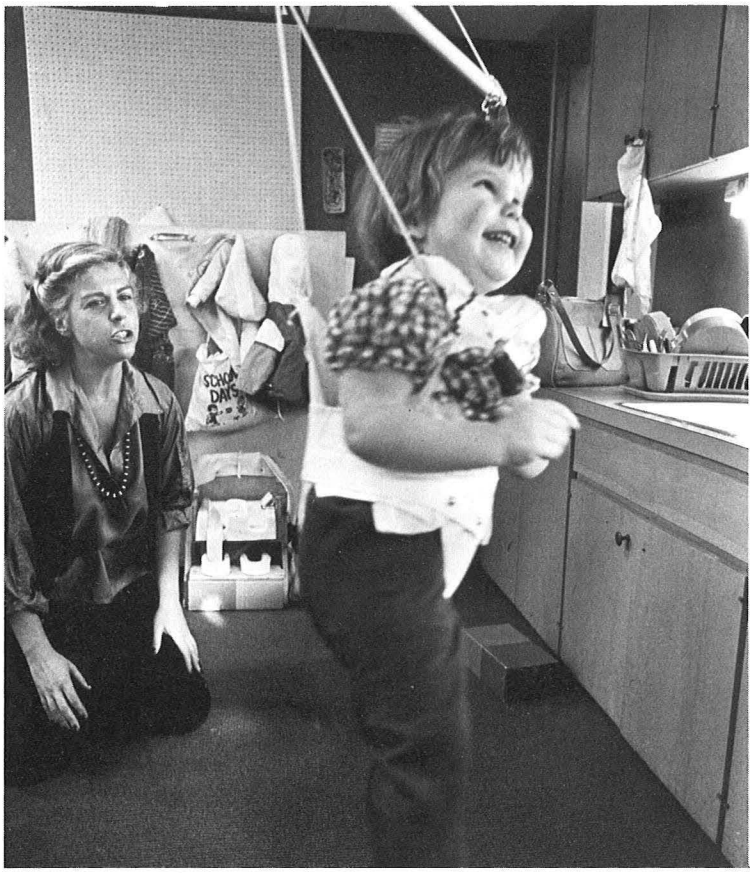
After the child enters an outpatient or classroom program, the teacher, physical therapist or a combination of special-education experts working with the child are brought into ongoing evaluation sessions.

Last September, the Texas Legislature enacted a bill that requires local school districts to provide education to blind and deaf children from infancy through three years of age. (From then on they are covered by previous legislation for the handicapped.)

Melissa, now nearly three years old, attends class at Callier with children

It looks like child's play, but games with Dr. Hammer are serious. Every activity is aimed at ascertaining Melissa's stage of development.

Melissa "flies through the air with the greatest of ease" while her physical therapist at Callier watches. The exercise aids blind children in space orientation.



Melissa gets in touch with her world, giving her sister a welcome-home hug.

Learning to mimic helps Melissa learn "signs" to communicate with others until she can talk.

from Dallas, Fort Worth and several suburban cities. Other children and their parents from remote areas of the state come in monthly for consultation visits, paid for by their school districts.

Why would children this young need an educational program? Most children don't start any schooling until they are five or six years old. Others start preschool programs at three or four.

Hammer explains it's true that many people do not understand the reasons behind these teaching programs. "And it's probably our fault, to a great extent. We professionals in special education need to do a better job explaining why early education for the handicapped is so important.

"The question should not be 'Why are the taxpayers in Texas spending all that extra money on these kids when mine don't even start school till kindergarten?' Rather, it should be 'What does society need to do to enable this child to join the mainstream of society and stay there?' Even more pragmatically, 'What will be the tax burden to society if this child – and many others – have to be institutionalized at a cost of thousands and thousands of dollars a month?'"

Things that other parents take for granted – their child's sitting up, walking, speaking – are developmental stages that are as difficult as scaling mountain tops to these children, most of whom have multiple handicaps. And each child is different. Each has a different starting point, and each develops at a different rate, intensifying the need for professional help.

People often point to Helen Keller

as a great woman who overcame her blindness and went on to do great work for humanity, relates Hammer. But it is often forgotten that Helen Keller did not become blind until she was 19 months old – that is, after she had 19 months of sight during the most important part of life developmentally. She not only knew how to "see" but she retained "memories of the world" acquired with vision that stayed with her throughout her life.

In contrast to Helen Keller who began life with sight, the literature of special education includes the case of a "blind" child raised by blind parents, who never "learned" sight. Although tests proved there was nothing physiologically wrong, he had never learned to "see."

Hammer's UAC team includes specialists in special education, psychology, pediatric neurology, physical and occupational therapy, social work, speech pathology, nutrition, dental hygiene and music therapy. All the children they see in consultation are referred to the UAC. Besides Callier, the team works in close cooperation with the Texas Commission for the Blind, Dallas Services for the Visually Impaired, Educational Service Center for Region 10, Texas Scottish Rite Hospital for Crippled Children, the Texas Education Agency and the Dallas, Fort Worth, Richardson, Garland and Mesquite school districts.

Current goals for Melissa worked out by the UAC team, her teachers and her parents include improving gestures for communication, beginning to talk and such self-help skills as feeding herself. "Until last August, the big goal was walking," says her mother with a smile. "Now she's all over the place."

Hammer says contact with other children and adults in the school, which she entered at age one, is vital. Since handicapped people tend to be isolated, they may never learn to adapt. And it's this adaptive behavior that makes the big difference in whether the handicapped child makes it.

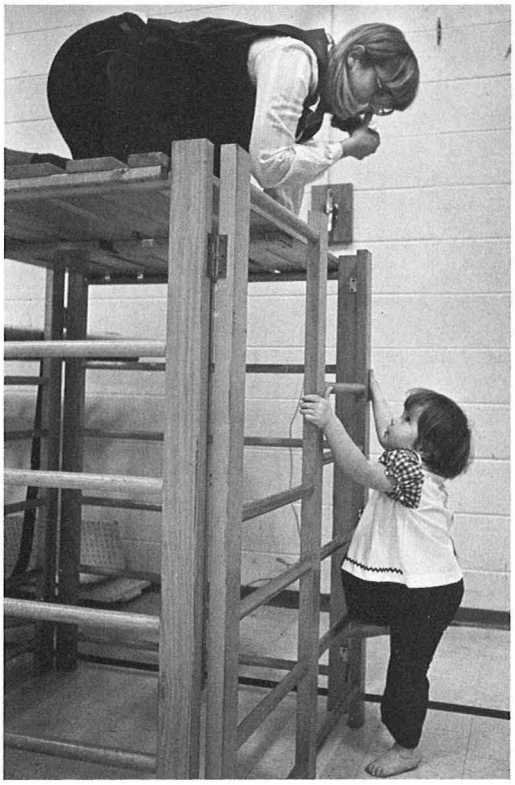
At school Melissa is learning about living with other people, as well as getting an intense "push" in her development. To the casual observer it might appear that the teachers and therapists play with the children all day long. But each "game" is a learning, part of a carefully planned strategy. The activities of each day, each week and each month work toward separate developmental goals.

What about other children in Melissa's class? Like blind children everywhere, their blindness has different causes. They also "see" in varying amounts.

"Actually, sighted people think of the blind as seeing blackness entirely or, at most, grayness. That simply is not true. Today we look at vision as a function that can be expanded," says Hammer. Also, today there are many devices to help the blind, such as special magnifying glasses, TV screens for reading and new sonic helpers, which pick up sound waves like "blind" bats. There's even a brain implant used experimentally in certain cases.

The switch from viewing the severity of the blindness to the amount of function of the sight was made in 1964 by Dr. Natalie Barraga, specialist in blind education at The University of Texas at Austin. This swing from looking at how much the blind don't see to how much they use their vision started a revolution in education of the blind, says Hammer.

"Much of the blindness we see is neurologically related. The visual system is part of the brain, and, although brain damage is irreversible, it is possible that the brain of a young child may learn to compensate. The more we exercise, that is, stimulate the brain, the more improvement may be possible in the vision. These special programs provide young children that constant directed stimulation." •



Coping with a physical barrier helps prepare Melissa for a normal life.

Senior nutrition students test their knowledge in a variety of settings

a Taste of Class

BY ANN WILLIAMS

Marian Jones is a victim of kidney disease.

She's also a senior nutrition student in the School of Allied Health Sciences. So her involvement with two Parkland patients who have renal disease has been especially interesting to her in her role as clinical dietitian on Parkland's 9 West.

Jones and the 12 other nutrition students in their final semester of the school's nutrition and dietetics program got a taste of the work they will be doing – and contrary to popular notion, they won't be working in the kitchen.

The clinical dietitian works as a member of the team in many different health settings. And each of these senior students works in a variety of clinical settings functioning as clinical dietitians under the supervision of professionals, working with patients of all ages and backgrounds and with a variety of diseases.

From nutrition education for four-year-olds in a day care center to the accurate but tedious calculation of a research diet to study the effects of cholesterol, this year's group of 13 seniors are eager to show what they can do.

They each rotate through five areas – general hospital, pediatrics, General Clinical Research Center, City Health Department and an outpatient clinic. Each of them spends an additional three weeks on a "selected experience" related to his or her special interest or career plan.

Four weeks are spent in a general hospital setting at either Parkland Memorial Hospital or Veterans Administration Medical Center in inpatient care, the kind of job many of them will have after graduation. Here they are assigned patients and assume responsibility for their nutritional care.

Jones and fellow student Lisa Mannion had their general rotation at Parkland, Jones on 9 West and Mannion on 5 East.

A kidney patient herself, Jones was most interested in her two patients with renal disease, though she also served patients with cancer and liver and pancreas disease.

Renal disease is probably the most complicated from a nutrition and diet modification standpoint. Food and fluid intake must be strictly monitored, and kidney function must be evaluated often. Frequently there is a critical point at which the patient must go from a protein-supplemented diet to a protein-restricted diet.

At the early stage of kidney disease, patients lose large amounts of protein in the urine and must add protein to their diets to have enough to replace it.

Normally, dietary protein not used for tissue-building is metabolized for energy with the waste excreted in the form of urea.

In the later stage of kidney disease,

however, the kidneys are unable to excrete urea, which as a result builds up in the blood. At this point the patient must reduce the protein intake to include just enough for tissue production.

Also in this stage many other foods must be restricted. The patient must cut down on salt to limit the sodium intake and cut out oranges, bananas, dried fruits and other foods high in potassium. An imbalance of sodium and potassium causes water retention and swelling when the kidneys are functioning normally. The patient must also avoid dairy products to limit phosphorus intake and avoid the loss of bone tissue. The doctor will also place a specific daily limit on fluids.

The dietitian must consider all these limits in planning the kidney patient's diet.

While this sounds like a hard diet to follow, Jones said the patients are usually good about sticking to a diet in the hospital. Their renal disease has just been diagnosed, and they are highly motivated to get well. Also their disease is so closely related to what they eat and drink that if they get off the diet, they experience a dramatic change in the way they feel. So even at home, they stay on the diet most of the time to make sure that they feel better.

Mannion served a different kind of patient while at Parkland. Parkland's 5 East pulmonary wing included many alcoholics and lung cancer patients.

As clinical dietitian, Mannion said there is little one can do for alcoholics, who usually are suffering from malnutrition. They have replaced their intake of nutrients with alcohol. And they have intestinal mucosa damage, resulting in poor absorption of the food they do eat. For these patients she made sure they got a multi-vitamin supplement. "I don't go in and tell them not to drink," she said. "I tell them about vitamin deficiencies. Alcoholics are frequently deficient in thiamine and folic acid. I tell them about foods rich in these things. Pork is rich in thiamine, and they usually eat a lot of salt pork. But sometimes their disease calls for salt restriction. So we talk about these things."

Many times cancer patients have a problem with loss of appetite, leading to a weight loss. The dietitians stress the need for protein and calories. They find out the patients' food likes and dislikes and add their favorite foods to the menu. When they go home, the dietitian recommends high-protein milkshakes, adding butter to vegetables, sugar to orange juice, eating double portions of meat, adding gravies and snacking all day long to ensure adequate protein and calorie intake.

Other patients requiring additional calories are the burn patients. Their metabolism has been compared to a runaway train. Some require three times as many calories as normal. The dietitian's challenge is to get them to eat that much. Often their food intake must be supplemented by hyperalimentation, introducing a high concentration of amino acids (protein building blocks) and glucose through a tube in a central vein.

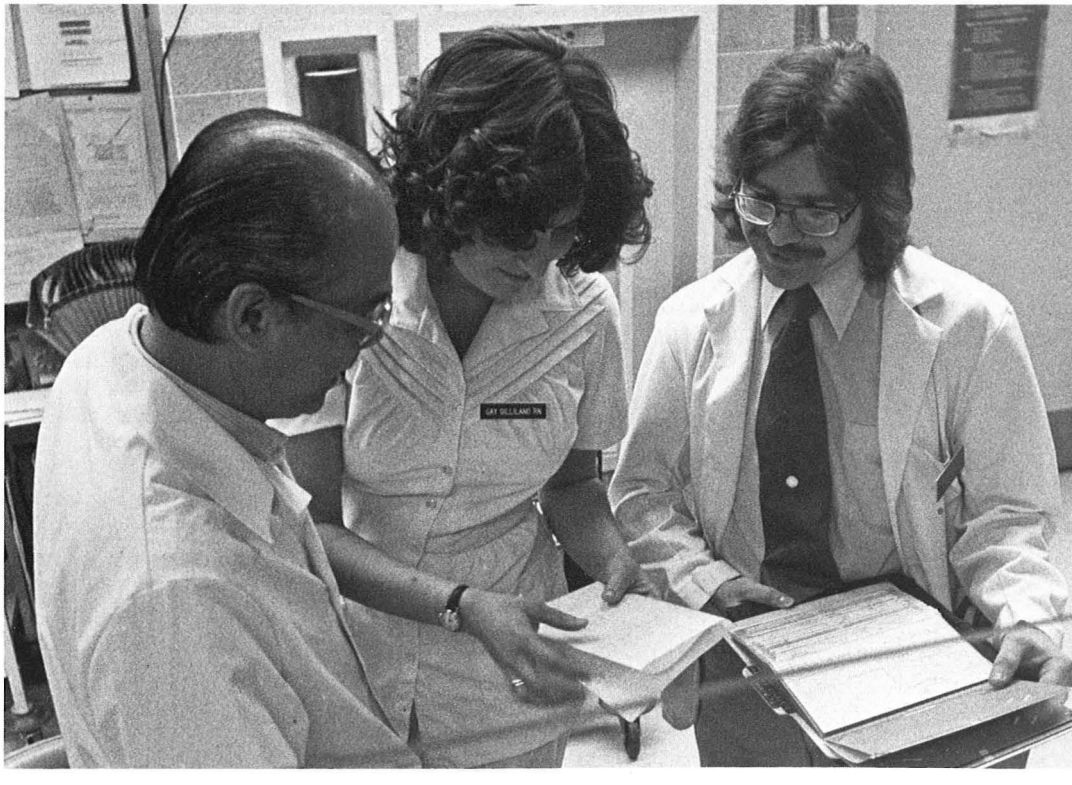
On the hospital ward Mannion developed her daily routine for dealing with patients. She would check every morning for new patients, reviewing the admission notes and lab reports.

One day she had one new patient, a young woman with asthma. The admitting physician had put her on an 800-calorie-a-day diet. "She's probably overweight. From the lab report I see that she's not anemic. But she's hypokalemic (low potassium level in the blood), and she's not taking diuretics (a frequent cause of hypokalemia). I need to know more about that. She's taking tetracycline, and I know that tetracycline interferes with calcium. I need to check for other food-drug interactions. I may suggest increasing her diet to 1,000 calories. Sometimes that gives patients some encouragement– 'Look, you've done so well on the 800 calories that we're adding these foods to your diet.'"

"You can have all the nutrition knowledge in the world, but if the patient doesn't eat the food, you've failed."

And then the student was off to question her new patient about her eating habits and give her tips for dieting at home. Later she would take plastic food models and teach a man who couldn't read how to stay on his diabetic diet at home.

Her daily duties included regular contact with the nurses and residents on her floor and "meal-time rounds" to see what every patient had eaten (or not eaten). Jo Ann Carson, assistant professor of nutrition and dietetics, stresses to her students that they must make sure all patients get ade-



Nutrition student, Tom Risner, (right) confers daily with other staff members at Dallas VA Medical Center.

While Marian Jones (left) counsels with a dialysis patient at VA Medical Center, she also learns from his experience.

GCRC patient Cindy Twomey demonstrates her new insulin pump for the students.

From left : Renfro, research dietitian Linda Brinkley and Wagner prepare to taste Wagner's dinner plan for a diabetic patient on an 1800-calorie diet.

quate nutrients daily – not just the patients with special dietary problems.

In the usual hospital setting, such as this, a food plan is very important, but a serving error of five percent on a special diet is still acceptable.

But in the General Clinical Research Center, where all of the students eventually spend a week in the human research setting, food servings must be accurate to within one gram, the weight of about one-fifth of a teaspoon of water.

"They question, question, question. They really keep us on our toes," says Linda Brinkley, research dietitian in the GCRC. Working under Brinkley's supervision, the students familiarize themselves with various research protocols. One project involves the use of insulin pumps (automatic insulin syringe) for patients with diabetes. The patient wears a small machine that gives a continuous injection of insulin instead of having one daily injection. With the pumps most patients gain weight. So the dietitian counsels them to cut down their food intake by 200 to 300 calories a day to maintain their weight level.

Here the students work with the kitchen supervisor, the nurses and the administrator. One of their most important learning experiences is the calculation of a metabolic diet with the scientific limits of the research protocol, the limits of the GCRC kitchen pantry and the patient's food preferences.

Margarett Renfro's problem was a daily plan for a patient on a triglyceride study being done by Dr. Frederick Dunn, faculty associate in internal medicine. This diet is designed to approximate the average American diet, high in cholesterol and high in ratio of saturated fats to unsaturated fats.

Dunn's protocol for one patient called for a daily diet of 2,700 calories of which 15 percent had to be protein, 40 percent fat and 45 percent carbohydrate. The fat intake also had to include 500-600 milligrams of cholesterol, and the ratio of saturated fats to linoleic acid (a polyunsaturated essential fatty acid) had to be three to one.

Mathematics is not enough, however. After the student completes the diet plan, the cook prepares the dinner so the student can try the meal and decide whether the patient can eat these foods every day for two weeks.

"Of course, it doesn't have to be prepared the same way every day. You can have all the nutrition knowledge in the world, but if the patient doesn't eat the food, you have failed," says Brinkley.

She told of one patient who did not like citrus fruits at all. Planning for enough vitamin C was a problem, but the patient loved canned tomatoes. "We just gave her canned tomatoes for breakfast, and that was fine for her. You have to use your imagination," she said.

Nancy Wagner learned to weigh the patients' daily salt allowances in the GCRC. This analytical balance is accurate to 0.01 gram.

The GCRC stint gives the students a good idea of how nutrition research is carried out with the precise measuring of nutrient intake and the collection and analysis of blood, urine and stool. The main advantage, says Brinkley, is to teach them how to read a research paper and keep up with research in the field. When a metabolic diet is described, they will know exactly how it was calculated. This helps them to interpret the significance of a research project.

The Dallas City Health Department provides still a different structure for the student dietitians. Working with K.K. Thomas and Rosa Adair there, they almost become traveling dietitians. Their routine includes home visits to patients with special diet needs, nutrition education for children in day care centers and counseling with patients in the city's geriatric clinics.

What can dietitians teach four-year-olds about nutrition? That they need food for energy and growth. That potato chips, candy and soft drinks are not the best choices for snacks. And that people in different places eat different foods. Then the dietitians can entice them into trying these good new foods.

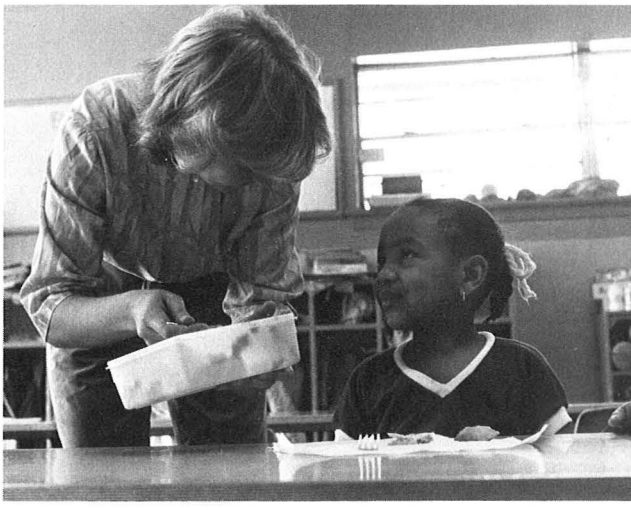
At the other end of the age spectrum, geriatric patients often need help with diets for weight reduction, diabetes or sodium restriction. Also elderly people commonly have a low intake of vitamin C, iron and some of the B vitamins, says senior student Randine Schoolfield. As part of her last semester's work she took a survey of elderly people for problems they have with nutrition and food selection.

As her selected experience, Marsha Martin took on a special project for the health department – rewriting a dietary questionnaire for use in the geriatric clinics so that the patients could understand it better and answer it more easily.

Jones did her selected experience in the Dialysis Center at VA Medical Center. Others did work with psychiatry, cancer or burn patients or with a clinical dietitian in private practice, who takes referrals from private physicians.

Carson keeps a complex schedule of each student's work, keeps in close touch with their professional supervisors and meets with the students for lecture and discussion every Monday. They then spend Tuesday through Friday on their work assignments, where they work closely with staff dietitians and also have easy access to faculty members.

By the time these students graduate as clinical dietitians they have a good idea where their interests and skills will lead them. They have had a chance to work with real patients and try their knowledge with the close supervision of a professional. And they graduate with the confidence that they know what they are doing. •



Lisa Mannion serves manicotti to one of the four-year-olds at Betty-Lin Day School. She also introduced the children to egg rolls and falafel.

Pediatric heart surgeon weighs
risks and benefits of 'hibernation' technique

A Delicate Balance

Many of the tiny patients are only hours old. The lesions to be repaired are a fraction of an inch in length. And instruments must be small enough not to obstruct vision.

Dr. Hisashi Nikaidoh works with the patience and mastery of a skilled artisan. Yet his is a most difficult art, that of repairing children's hearts.

As a pediatric thoracic surgeon and associate professor of surgery at Southwestern Medical School, Nikaidoh is well familiar with the risks of performing open-heart surgery on children.

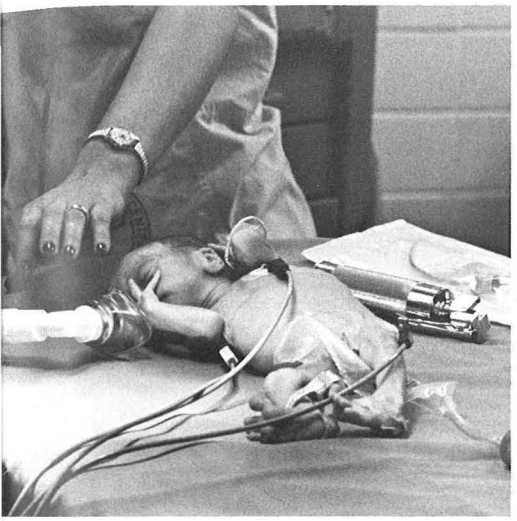
In the average hospital setting, one-tenth of the children operated on for congenital heart disease (abnormalities of the heart and vessels present from birth) do not survive.

Intellectualizing the statistics of how many will make it and how many won't is little consolation when a child dies, however. The Japanese-born doctor talks of feeling as if he has fathered many of these children, especially those he must treat over an extended period.

Of all the known risks of performing open-heart surgery on small children, Nikaidoh recognizes one potential consequence that is very difficult to detect – brain damage.

The discouraging fact is that some of the children whose lives are saved by surgery may never have normal brain function.

By conducting animal studies, Nikaidoh is hoping to confirm or dispute criticisms directed against a surgical procedure often used in repairing the most complex heart malformations. It is this procedure that is suspected of damaging the brain – a procedure of body cooling, where the infant is put into "hibernation" and cooled to a temperature of about 60



A two-pound premature infant is prepared for open-heart surgery.

degrees F.

Called "hypothermia and circulatory arrest," the technique involves cooling the baby down, and stopping the heart and blood circulation. Once this is done, the surgeon can perform the delicate and tedious operation on a dry, motionless heart.

Among the different variations of hypothermia and circulatory arrest, the most commonly preferred begins by giving the baby a general anesthetic. Then once the baby's chest is opened, the infant is connected to a heart-lung machine that has a built-in heat exchanger.

As the blood circulates through the heat exchanger, it's slowly cooled by water-filled coils and sent back through the body. This is known as "core-cooling." When the infant is cooled to the desired temperature, the heart-lung machine is turned off and blood from the body is allowed to collect inside the machine. Tubes are removed from around the heart, and the surgeon is provided with a dry operative field. After the operation the blood is returned back into the infant's circulatory system, and the baby is slowly rewarmed.

The slowing down of life processes is effective for lengths of time up to one hour as long as the baby weighs under 12 pounds. And, because of the relative ease of working on a bloodless, motionless heart, the technique is preferred by surgeons when intricate repair of heart malformation is required.

But even though hypothermia and circulatory arrest can be helpful in repairing heart malformation, the procedure may also be causing damage to the brain.

"Brain damage in infants can be very subtle," says Nikaidoh, who received most of his medical training at the University of Tokyo and at Mount Sinai Hospital in New York. He explains that since the children are often below one year of age, preoperative mental aptitude testing is not conclusive. Doctors have no way of telling if those children with brain damage after the operation were ever normal to begin with.

The surgeon's dilemma is in the balancing of risks. The children with heart problems so complicated as to warrant hypothermia and circulatory arrest represent only about 10 percent of those needing open-heart surgery. And these high-risk children would probably not survive a year without heart surgery. Since other surgical methods have not proven as effective in increasing the rate of survival in complex cases, doctors often opt for hypothermia and circulatory arrest, a technique many believe has the best chance of saving a life, and brain damage becomes a secondary consideration.

This is the dilemma that Nikaidoh must face each time he uses the procedure.

By conducting animal studies, Nikaidoh is hoping to determine if there is indeed damage done to brain tissue while using the technique, and if so, which areas are affected most frequently and most heavily.

He is working with a team from the medical school (including a cardiologist, an anesthesiologist, biomedical engineers and a cardiopulmonary bypass technician) to measure blood flow and temperature distribution. They are focusing on various regions of the brain, kidneys, heart, gastrointestinal tract, liver and skeletal muscles in laboratory animals. The blood flow pattern is being traced during the cooling and rewarming phases by injecting tiny plastic beads coated with a radioactive material into the animals' blood streams. As the beads hit small blood vessels and become lodged, the doctors are measuring number and placement of the beads to determine blood flow. Temperature throughout the brain is being measured by sensor-tipped needles. And the rates of brain oxygen consumption and carbon dioxide production during the procedure are being calculated.

Doctors fear that during the cooling phase, the blood flow within the brain may not be uniform, and may leave some areas relatively warmer than others. Such irregularity of cerebral blood flow offers only spotty protection to the brain when the blood is drained into the heart-lung machine.

While the technique of hypothermia and circulatory arrest has indeed been used in saving the lives of small infants with congenital heart disease, it is not

Surgical team huddles over a tiny patient in the silent operating room at Children's Medical Center.

Mother and grandmother see four-year-old Eva for the first time after her heart surgery.

always the preferred surgical method. Nikaidoh himself says he avoids the procedure whenever possible. The alternative method is the use of the heart-lung machine alone. The machine diverts the blood flow around the heart and lungs and can oxygenate the blood artificially. More often than not, however, the cardiopulmonary bypass machine does not give the surgeon a dry, bloodless field. The operative field is frequently obscured by a continuous flow of blood in the area. And large tubes are required in and around the heart, limiting the space for surgical instruments.

Doctors actively argue about which technique is better – hypothermia and circulatory arrest with limited use of the heart-lung machine for cooling and rewarming, or the use of the heart-lung machine alone. Nikaidoh argues against "indiscriminant use" of one technique, especially in operations on very young children. "Simple lesions in a child of more than two to three years of age can be repaired with conventional cardiopulmonary bypass. But when challenged with a child of less than one year with a complex lesion there is a formidable problem technically. Hypothermia and circulatory arrest gives a little more space to work in. We're just not 100 percent sure it's safe, especially to the brain."

The use of the heart-lung machine with heat exchanger is open to criticism, for another reason says Nikaidoh. It can cool the blood so rapidly that some of the blood vessels may go into spasm. Nikaidoh and his research team are in hopes that their findings on the blood flow distribution and temperature in the brain will help them devise safer and more effective cooling and rewarming strategies.

As for the nature of congenital heart disease, the cause of 90 percent of all cases can only be guessed. Known causes consist of genetic factors, diabetes in the mother, infection during pregnancy (such as rubella), radiation exposure and drugs taken during fetal development.

About eight out of 1,000 babies within the general population are born with a heart malfunction – and of these eight, three die within the first month of life.

The use of hypothermia and circulatory arrest is not new as a means of treating children with congenital heart defects, according to Nikaidoh. It originated in the United States in the early 1950s, when the technique involved packing the infant in ice. But in this country it was quickly overshadowed by the popularity of the heart-lung machine without the added heat exchanger.

It was left to the Japanese to develop hypothermia and circulatory arrest. Their original technique involved covering the baby with a thin plastic sheet and then putting the child into an ice water tub. Along with this method of "surface cooling," the blood flow around the heart was stopped by clamping the aorta.

Core-cooling using the heart-lung machine with heat exchanger made the original method obsolete. And it is this method that is used more frequently now both in Japan and in the

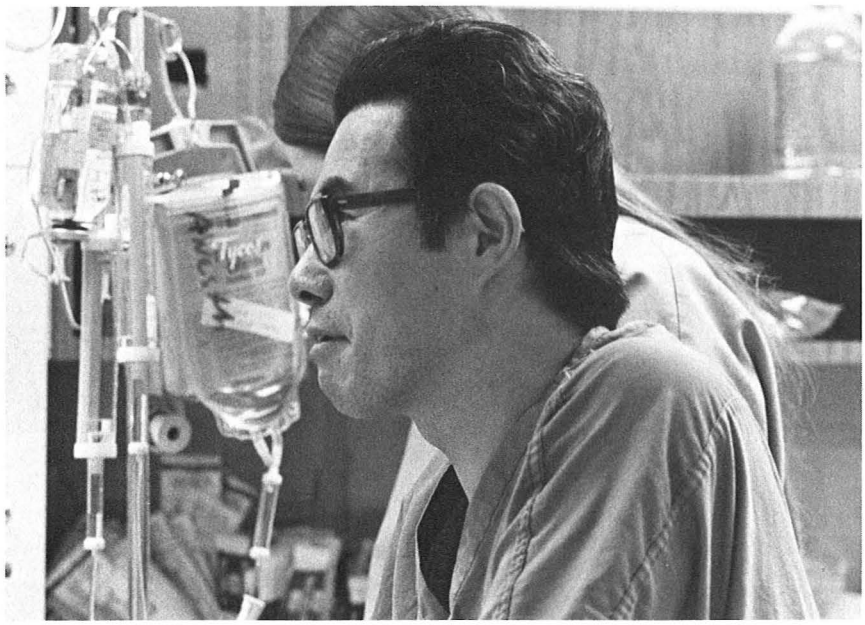
United States. This more modern method removes a technical danger inherent in the original procedure – the development of an irregular heart rhythm.

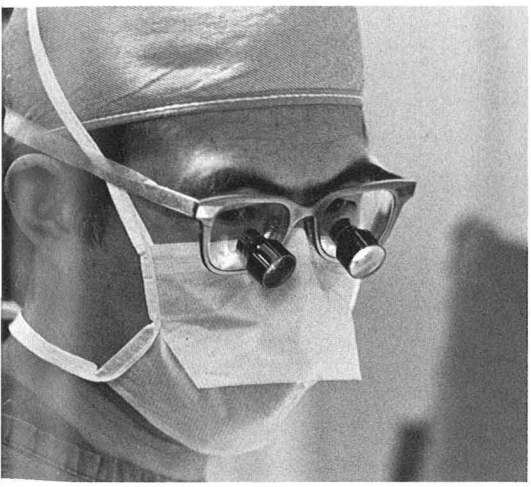
"We have fragmentary information on hypothermia and circulatory arrest, but the data have never been collected in a coordinated manner," says Nikaidoh. "There have been clinical studies performed, and studies have been done on organ cooling. But we continue to compare apples and oranges. We are forced to compare results of studies done on different animals, in different settings and with different anesthetics. Our study will involve various aspects done in the other studies at one time and in a setting simulating the present-day practice in our operating room.

"We will be looking to see what type of hypothermia-inducing technique would be best for the preservation of the brain, whether it's surface-cooling plus core-cooling or core-cooling alone. Or we may yet find an additional refinement in the induction of hypothermia." •

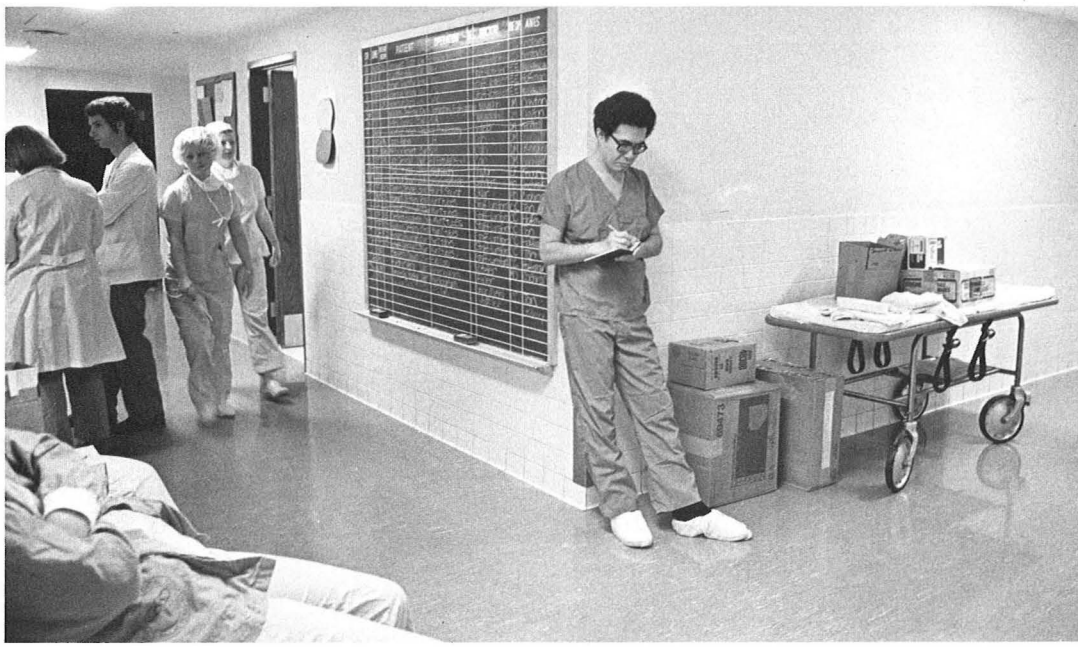
Susan Rutherford

Nikaidoh is researching a body-cooling procedure used in complex surgery for congenital heart malformations – a procedure sometimes thought to cause brain damage.





Nikaidoh is well aware of the surgical risks involved.



A physically exhausting schedule of operating on small patients becomes routine.

Southwestern's 'pre-computer' registrar took the med students to raise. Now they've come up with a way to say,

'Thanks for the Memory'

'Anne Rucker has a sixth sense about what people need.'

Anne Rucker became registrar at a time when women didn't have such authority. And it's been said she ruled with a heavy hand. But Anne Rucker knew every student and followed them all from the day they applied to medical school throughout their careers. She still keeps track of many of them, knows the names of spouses, how many children they have and where the children are.

"She took us all to raise."

"Anne Rucker has a sixth sense about what people need."

"She cared about us. When everybody else was wondering why we weren't making better grades, her office was a refuge."

"She was pre-computer – she managed to retain everything in her head."

The varied images recalled by students from 1944 till 1974 furnish a study in contrasts of the much-loved retired registrar. But somehow you expect a combination mother-computer to be larger than the petite "pink lady" sorting mail in the doctors' mail room at Parkland Memorial Hospital.

"I came down here from New York City–very lonely. She took me under her wing. She invited me to her home for dinner. In New York that was unheard of. She invited me to see a visiting Japanese troupe of Kabuki players. I love that kind of thing. And I had been totally lost and didn't like Dallas at all. To this day I remember her kindness." Dr. Penelope W. Coates, associate professor of anatomy at Texas Tech Health Sciences Center, still keeps in touch with Rucker. Coates received her master's degree here in 1957 and her Ph.D. in 1969.

Dr. Norman Gant ('64), chairman of Obstetrics and Gynecology, remembers the time Rucker saved the life of the dean of student affairs, Dr. Robert W. Lackey.

Right after the school moved to the present location, it acquired its first guard booth and parking lot gate. A classmate of Gant's, T.W. Carpenter, had a "brand new, used Chevy" that he was really proud of. One morning the parking gate lowered onto his brand new, used car. Carpenter got out of the car, broke the gate off at the hinge and carried it into the building.

"We could hear him coming down the hall–ka-thump! ka-thump!–hitting the floor with the gate with every step. And he was on his way to find the dean! Boy, was he mad! He was going to kill the dean. And Miss Rucker talked him out of it. I mean–she did a lot of talking.

"She always did her best to get us to do right. I wonder–do you suppose she was behind Dr. Lackey's lecture on keeping your fingernails clean?"

Billie Cantrall worked as Rucker's assistant from 1946 until 1974. "Anne Rucker was meticulous. She paid great attention to detail. I used to tease her because every scrap of paper had to be dated! Of course, that's good business. And she practically never made a mistake. Not that she made a big thing of it. That's just the way she was," says Cantrall.

Anne Rucker's office was the hub of the medical school from Southwestern Medical College in 1944 to The University of Texas Health Science Center at Dallas in 1974. Housing the student mailboxes and the fire bell, it was the communications center in the old buildings on Oak Lawn.

Cantrall remembers that the fire bell would go off for no reason so they just started ignoring it until Dean A.J. Gill would come through and shoo them out "just in case."

Not only was Rucker meticulous in recording information, she carefully stored the precious transcripts in a huge double safe so deep that she had to stand on a drawer to reach the back.

In addition to the mail boxes, the candy bowl on her desk, replaced by homemade cookies at Christmas, attracted students also. And Coates remembers sitting in the Registrar's Office to take her final exam in the required correspondence course in Texas history. One student, Dr. John Richards ('45), brought his first baby over from Parkland wearing only a diaper to meet the registrar. (One suspects collusion because that baby grew up to graduate from Southwestern also.)

Cantrall and Rucker share fond memories of the trials and tribulations of 28 registrations and commencements and the careers of 2,500 students from receiving their applications through the matching of internships and presentation of diplomas.

Eight years ago some of the graduates got together and decided to do something for the school in Rucker's honor. Thus began the Anne Rucker Fellowship Fund. Since that time 22 students have received summer stipends in her name as they worked on research projects at the health science center.

One of the students, Dr. Rebecca Shoden ('79), now a resident in obstetrics and gynecology at University of Michigan Affiliated Hospitals, coauthored a book while on her Rucker fellowship. Shoden and her faculty sponsor, Dr. Sue Griffin, assistant professor of cell biology, wrote "Fundamentals of Clinical Nutrition" especially for medical students and nursing students. Published by McGraw-Hill in March, the book will also appeal to the lay public who want scientific information on nutrition.

Dr. Cliff Seidel ('49), immediate past president of the Southwestern Medical School Alumni Association, has assumed responsibility for directing the fund-raising to make the Anne Rucker Fellowship Fund a trust so that the interest will support several students each summer. "The warm feelings that our alumni have for Anne have prompted a most generous and exciting response to this effort named in her honor," Seidel said.

Since Rucker's retirement in 1974, she says she enjoys "piddling," but she just can't piddle full time. Knowing that eventually everyone has to pick up the mail, she keeps up with many of her students through her Wednesday morning job in the doctors' mail room at Parkland. She enjoys the fact that one of "our prize students," Dr. Charles Mullins ('54), is now administrator of Parkland. It is no exaggeration to say that she can take some credit for the graduates' professional achievements. As Mullins says, "She was the one the students looked to for support. She always enjoyed our accomplishments as if the they were her own." •

Ann Williams

Note: As of May 1, more than $50,000 has been pledged in this drive. Contributions may be sent to Miss Anne Rucker, c/o Alumni Office, The University of Texas Health Science Center, 5323 Harry Hines, Dallas, TX 75235.

FRONT & CENTER

National Academy of Sciences

Dr. Ronald W. Estabrook, a well-known researcher and educator in biochemistry, has been named a member of the National Academy of Sciences – the nation's top scientific advisory group.

Estabrook, chairman of the Department of Biochemistry, was one of three Texans among 60 scientists chosen as new members of the academy in April 1979.

Estabrook is holder of the Virginia Lazenby O'Hara Chair of Biochemistry and was one of three scientists who discovered the role of the enzyme system Cytochrome P-450 – a key system in the body that is important in the processes suspected in lung cancer.

Dr. Joseph L. Goldstein and Dr. Michael S. Brown joined the prestigious NAS roster with their April 1980 election to membership. As two of only 59 scientists appointed this year, they are the only new members from Texas.

Goldstein is chairman of the Department of Molecular Genetics, and Brown is professor of molecular genetics and director of the Center for Genetic Diseases. They are co-holders of the Paul J. Thomas Chair of Medicine.

The two scientists opened a new research frontier with their discovery of how one kind of inherited defect causes heart attacks.

They were previously honored by the NAS with the April 1979 Richard Lounsbery Award for Biology and Medicine. The first annual award included $50,000 with a $20,000 travel and research grant.

Goldstein and Brown have been widely recognized for their discovery of a fundamental chemical pathway by which the body controls production of cholesterol, unraveling a genetic defect that causes high blood fat. Working with victims of this ailment, the two discovered that the sparsity – or sometimes complete lack – of a specialized receptor on cell surfaces meant fat production inside the cell went uncontrolled and fat was not removed from blood. Victims of this genetic defect often die of heart attacks at an early age.

Also honored at the NAS April 1979 meeting were Cecil H. and Ida M. Green. The Dallas philanthropists who were among the founders of Texas Instruments, Inc., were awarded the National Academy of Sciences Public Welfare Medal "for their outstanding role as discriminating donors, seeking those opportunities where their support of science could make a qualitative difference – to people and institutions."

The Greens are among the most generous benefactors of the health science center.

The NAS is an organization of distinguished scientists and engineers concerned with the furtherance of science and its uses for human welfare. Its congressional charter of 1863 – signed by Abraham Lincoln – calls on the academy to serve as official advisor to the Federal Government, although it is not a government agency. The membership now totals 1,324.

Nuclear medicine

Dr. Frederick J. Bonte announced in April he was relinquishing his post as dean of Southwestern Medical School to become director of the proposed Center for Nuclear Medicine, which will be established at the health science center.

Bonte, a radiologist, is widely respected for his contributions in the field, particularly his part in the development of nuclear heart imaging. He was appointed dean of the medical school in 1973, after serving as chairman of the school's Department of Radiology and chief of Radiology Services at Parkland Memorial Hospital. Currently, he serves as president of the Dallas County Medical Society.

The Center for Nuclear Medicine will serve not only to coordinate the efforts of faculty members in several different departments but also will permit the health science center to recruit selectively additional faculty to strengthen the overall program, according to President Charles C. Sprague.

Mullins heads Parkland

Dr. Charles B. Mullins marked his first anniversary as chief administrator of Parkland Memorial Hospital June 11. Prior to his June 1979 appointment, he had been serving in a specially created liaison post designed to improve communications between the hospital and the health science center.

Mullins' appointment as Parkland administrator initially touched off a flurry of controversy locally, but under his leadership the county approved an $80 million bond issue for improvements to the hospital.

Mullins said at the time of his appointment that he wanted Parkland to provide compassionate medical care for the indigent as well as highly specialized services for all citizens of the county. He said: "Parkland is basically a good hospital with a good admixture of patient population. There are good people there who want to develop its potential."

A 1958 graduate of Southwestern and chief resident in medicine at Parkland in 1965, Mullins joined the medical school faculty in 1966 and was affiliated with the institution until his hospital post appointment.

Grollman memorial

Dr. Arthur Grollman, professor emeritus of internal medicine at the health science center, died Jan. 27 following a brief illness.

An internationally known researcher, Dr. Grollman was the first to develop a method of determining cardiac output and pioneered in the

effects of kidney function on hypertension. He developed peritoneal lavage (dialysis), a method of ridding non-functioning kidneys of waste, and his work led to the development of the artificial kidney.

Before his retirement from the medical school in 1977, he held the positions of professor of medicine, professor and chairman of the Departments of Physiology and Pharmacology, acting chairman of the Department of Biochemistry and professor and chairman of the Department of Experimental Medicine. He joined the faculty here in 1944.

Memorial services for the doctor were held at the health science center Jan. 31.

Gill memorial

Dr. A.J. Gill, professor emeritus and former dean of Southwestern Medical School, died Aug. 18, 1979, at his farm in Corsicana. He was killed when a tractor he was driving overturned.

Dr. Gill retired in 1977 after 34 years of active association with the medical school as teacher and administrator. He came here as assistant professor of pathology in 1943, a charter member of Southwestern's faculty. He served as dean of the school from 1955 until 1967 during a critical time in the school's development. On Gill's retirement, President Charles C. Sprague announced the $100,000 endowment of the A.J. Gill Professorship in Pathology.

A memorial service for Dr. Gill was held at the health science center Aug. 21, 1979.

T.V. health series

A program aimed at helping the public deal with common medical situations – from reading their own blood pressure to understanding the complex health care delivery system – went into its second successful season in April on Channel 13, the local PBS affiliate.

The program, "Here's to Your Health," a self-help, self-care series, began in May 1979 with health science center co-host physicians Al Roberts and Anne Race and nationally known entertainers who help interpret otherwise complex medical subjects for the general public.

Their message: Contrary to popular opinion, you don't need an M.D. degree to tackle many common medical situations. All you need is the determination to take responsibility for your own health and a desire to acquire the skills that will enable you to work as an "activated patient" in partnership with your physician.

"I am committed to the series," says Roberts, "because I believe people who view it regularly gain a better understanding of the health care system and a lot more knowledge of what they can do to maintain and improve their health. I also think we help people make more rational choices from a bewildering array of health care services." Roberts, a nephrologist, is associate dean and professor of internal medicine.

Race is also committed to the program's concept. She is a teacher, physician, practicing psychiatrist and a firm believer in preventive health.

"The secret of preventive health," says Race, "is not to wait until the crisis occurs. I'd like to help inspire people to take care of themselves, to teach them to learn the difference between problems they can cope with themselves and those that really need the attention of a physician."

Brain symmetry

A new research program has been established at the health science center to investigate brain and nervous system structure and symmetry as it relates to human physiology and performance.

The program deals with the basic structural and chemical reasons for such questions as why verbal skills are generally stored in the left brain and the whys of right- and left-handedness. "It may be," says Dr. Donald J. Woodward, principal investigator for the project, "that unique talents – musical, artistic, literary – or unique deficiencies could be due to differences from normal in proportionality of brain parts."

Woodward is using a laboratory-based approach to experiments in areas such as how variations in form, structure and symmetry of the nervous system are related to overall body structure and performance; the possible relationship of brain and nervous system neurotransmitter chemicals; such things as right- and left-handedness; and an investigation of eye dominance and other visual phenomena of the brain.

The scientific effort is made possible by grants from the Biological Humanics Foundation of Dallas, under the auspices of the Eugene McDermott Center for Human Growth and Development, and enlists the aid of a number of disciplines. Dr. P. O'B. Montgomery is chairman of the McDermott Center Advisory committee. Other committee members include Dr. Heinz Eichenwald, chairman of the Department of Pediatrics, and Dr. Kern Wildenthal, dean of the Graduate School of Biomedical Sciences.

Unger honored

Diabetes research scientist Dr. Roger H. Unger has been chosen to deliver the Claude Bernard Lecture to the European Association for the Study of Diabetes.

The invitation is the highest honor the association can confer, according to the association president. Unger will present the lecture at the annual meeting of the association in Athens, Greece, in September 1980.

A professor of internal medicine, he pioneered research in isolating and delineating the role of the hormone glucagon. Glucagon is now seen as a major factor, along with insulin, in the diabetes disease process.

Ambulatory care center

Dr. Thomas D. Moore, professor of pediatrics, has been named associate dean for health services at the medical school and executive director of the school's Ambulatory Care and Teaching Center, scheduled to open in January 1983.

The Ambulatory Care and Teaching Center, financed by the State of Texas and The University of Texas System, will bring together "clusters" of medical specialists to see complicated cases on a consultation basis. Because it is a teaching facility, it will be a low-volume operation with an emphasis on education.

Moore, a specialist in community health care, delivery of health services, clinical pediatrics and management programs in these related areas, has served as executive director of the Children and Youth Project in West Dallas since 1969.

Carrell Professor named

Dr. Vert Mooney, professor of surgery and chairman of the Division of Orthopedic Surgery, has been appointed W.B. Carrell Professor of Orthopedic Surgery.

The professorship was instituted by the board of Texas Scottish Rite Hospital for Crippled Children.

Somatostatinoma syndrome

The first clinically diagnosed case of somatostatinoma syndrome – a disease caused by a tumor producing an excess of the hormone – has been described by researchers here. Results of the study being done at the General Clinical Research Center

were reported in the lead article of the Aug. 9 issue of the "New England Journal of Medicine." Dr. Guenter Krejs, a gastroenterologist and associate professor of internal medicine, authored the article.

"The syndrome we have described probably occurs as frequently as other known islet cell tumors such as gastrinomas, insulinomas and glucagonomas but has so far gone unidentified," said Krejs. "But we are now able to recognize the symptoms of the somatostatinoma syndrome, which include gallstone disease, steatorrhea and diabetes in the presence of a pancreatic tumor, and make a correct diagnosis."

The hormone somatostatin was only isolated in 1977, but since that time a tremendous body of knowledge about the effects of somatostatin has become available. It seems to be a key hormone in the pancreas, suppressing the release of both insulin and glucagon. And studies done in the GCRC indicate it may be easier to control diabetes if both insulin and somatostatin are administered.

Results of this latest study were presented by Krejs at the Diabetes World Congress in Vienna, Austria, last fall.

Eichenwald honored

Dr. Heinz Eichenwald, chairman of the Department of Pediatrics and an internationally known expert on child care, received two prestigious awards within the last year.

The West German Republic presented Eichenwald with the Von Humboldt Prize for his "significant and continuing contributions to Pediatric Infectious Diseases." The award, presented in April 1979, included a prize of 72,000 Deutsche marks.

The United Cerebral Palsy Research and Education Foundation awarded the Dallas educator its 1980 Weinstein-Goldenson Award for Medical Research May 3. In announcing the award, the foundation cited Eichenwald's "significant contributions in the field of infectious diseases of children that have contributed to the decreasing incidence of cerebral palsy." The award included $1,000 and a gold statuette.

LBJ Research Award

Dr. Sharon Cassidy, assistant professor of internal medicine and physiology, was presented the 1979 Lyndon Baines Johnson Research Award for continuation of her research on the effects of lung inflation on the heart. The award was made at the annual meeting of the American Heart Association Texas Affiliate.

The award is presented annually to a young investigator working on cardiovascular problems. Cassidy's proposal received the highest priority rating from the association based on its scientific merit.

Cassidy's studies have shown that the major cause of decreased cardiac output in over-inflated "shock lung" is in fact increased lung volume. The increased volume initiates a reflex that depresses heart function. Prior to these studies, it was thought that the pressure of the over-inflated lungs mechanically cut off the blood vessels causing the decrease in blood flow.

In shock lung, the most serious post-operative problem a patient can have, the lungs are filled with fluid and collapse, resulting in hypoxia. The condition also occurs after near-drowning or with viral pneumonia or acute pancreatitis.

Non-hypoglycemia

Diagnosed in epidemic proportions, hypoglycemia (low blood sugar) has been blamed for the outcome in Vietnam, jetliner crashes, headhunting among primitive tribes, the soaring divorce rate, drug abuse, street crime and mental illness.

But two professors of internal medicine at Southwestern Medical School, Drs. Dan Foster and Leonard Madison, say things have gotten out of hand. And the two are critical of doctors who profit by keeping the "non-hypoglycemic" patient coming back for costly treatments.

One of the problems, they say, is in faulty diagnostic procedures, primarily the five-hour oral glucose tolerance test commonly and incorrectly used to detect the disease. The test involves drinking a large dose of glucose solution on an empty stomach and then testing for glucose concentration in the blood every hour for five hours.

But perfectly normal, asymptomatic people may have a classical hypoglycemic reaction to the test. A hypoglycemic response to the glucose tolerance test is a natural response to a high dose of glucose, and low blood sugar during the test does not indicate disease.

According to the doctors, reactive hypoglycemia should be diagnosed only after eating normal balanced meals. Blood should be taken at the height of the patients' symptoms and tested for low blood sugar levels. But both doctors have found that patients tested under these conditions rarely have the disease, even though they are experiencing the symptoms. This is because hypoglycemic symptoms are nonspecific and at times identical to acute anxiety.

Madison stresses it's most important to remember that the five-hour oral glucose tolerance test should never be used to establish the diagnosis of reactive hypoglycemia.

Wildenthal named dean

Dr. Claud Kern Wildenthal, a 38-year-old scientist and educator widely recognized for work in heart research, has been chosen as the next dean of Southwestern Medical School.

Wildenthal's appointment was recommended by a Southwestern search committee to Dr. Charles C. Sprague, president of the health science center, and approved by the UT System Chancellor, Dr. E.D. Walker.

"I'm extremely pleased that we will have a person of Dr. Wildenthal's caliber as dean," said Sprague, noting his outstanding administrative record as dean of the Graduate School of Biomedical Sciences, his research that developed new methods for culturing heart tissue and his citations for teaching ability.

Wildenthal, who possesses both M.D. and Ph.D. degrees, will assume his new duties Sept. 1. He will replace Dr. Frederick Bonte who becomes head of the new Center for Nuclear Medicine being developed at UTHSCD.

Chosen to head the medical school from which he graduated 16 years ago, Wildenthal has had a wide diversity of experience and education both domestically and abroad.

He is scientific consultant to the Strangeways Research Laboratory in Cambridge, England. It was in Great Britain in studies with Dame Honor Fell, that Wildenthal was able to develop methods for maintaining mouse hearts in culture over long periods of time.

Wildenthal received a Ph.D. in cell physiology in 1970 from the University of Cambridge. Prior to his M.D. degree from Southwestern, he graduated from Sul Ross College in Alpine with a B.A. degree that combined majors of English Literature and Premedical Sciences. •

Susan Wilson

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