THE UNIVERSITY OF ARIZONA

SARVER HEART CENTER

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Newsletter Issue 53 • Winter 2008

A generous gift to enable advances in heart failure treatment: Tom and Sabina Sullivan with Mark Friedman, MD

A Comprehensive Program for Heart Failure Patients

One year ago, Tom and Sabina Sullivan established an endowed chair dedicated to the prevention and treatment of heart failure. Mark Friedman, MD, has been selected as the inaugural recipient.

"This endowment will allow us to develop a more comprehensive program for heart failure patients, including evaluation and treatment both for outpatients and patients requiring hospitalization," says Dr. Friedman. "We will be able to closely follow patients after a hospital stay to try to avoid the need for recurrent hospitalizations."

The multi-discipline program, a collaborative venture among the UA Sarver Heart Center and University Medical Center (UMC), will include cardiologists, cardiothoracic surgeons, nurses and nurse practitioners, pharmacists as well as home health and social workers.

"This comprehensive, multi-disciplinary approach to the management of patients with heart failure is what sets the new Sarver Heart Center heart failure program apart from peer institutions," says Dr. Friedman. "We cover the whole spectrum, from aggressive medical

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...from the Director

With this issue we are proud to announce the appointment of Dr. Mark Friedman as medical director of the Sarver Heart Center and University Medical Center's expanded Heart Failure Initiative. Dr. Friedman is the recipient of ***The Tom and Sabina Sullivan, Sr. Endowed Chair for the Prevention and Treatment of Heart Failure****. Read more about this program, designed to expand our ability to treat more patients with heart failure, in the article, "Focus on Heart Failure" (page 4).*

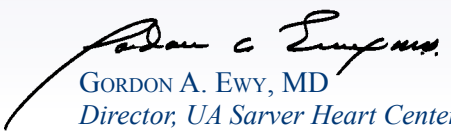
We think it is important to emphasize that our Sarver Heart Center surgeons not only draw on the latest in artificial heart and device technology in their care for those "at the tip of the heart failure iceberg," but they also specialize in aortic valve replacements, and "routine" coronary artery bypass surgeries. In an aging population, one of our most pressing needs is to do our best to prevent patients from entering the advanced stages of heart failure.

Along preventive lines, Dr. Vincent Sorrell's research uses imaging technology to identify heart failure patients at risk for sudden cardiac death. It is a poorly recognized fact that sudden cardiac death is more common in individuals with less severe forms of heart failure. Supported by the Steven M. Gootter Foundation, this work holds great promise.

The multidisciplinary nature of the Sarver Heart Center puts us in the unique position to be a major driving force behind translational and transformational research—the so called "bench-to-bedside approach." In his interview, Sarver Heart Center Member Dr. Steve Goldman sheds light on the groundbreaking work he does with an interdisciplinary team that includes Dr. Hoang Thai, Dr. Elizabeth Juneman and others at the Southern Arizona Veterans Administration Health Care System. Studying animal models of heart attacks and heart failure, Dr. Goldman's team has shown how certain medications and a variety of cell therapies can mitigate and even reverse the detrimental effects of heart attacks and heart failure.

Another centerpiece in our bench-to-bedside approach to heart failure is our Molecular Cardiovascular Research Program, headed by Sarver Heart Center Co-Director Carol Gregorio, PhD.

And finally, we are very aware of the fact that all who support the Sarver Heart Center with their contributions are an indispensable part of our team!



GORDON A. EWY, MD
Director, UA Sarver Heart Center

A Comprehensive Program for Heart Failure Patients
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management in the early stages of the disease, to device implant or heart transplant for those patients who need more than medical therapy alone."

"My father passed away because of heart failure," says Tom Sullivan, a Tucson businessman. The personal experience with this disease led Tom and his wife, Sabina, to consider a gift to the UA Sarver Heart Center. "After touring the Heart Center and learning about its vision from Dr. Ewy, I was impressed. That was when I knew a gift to the center would have an impact and be used wisely."

Originally from a small town in North Dakota, Tom did not stay long and left to travel the world while in the military. After his service, he earned a law degree from The University of Colorado at Boulder. "I practiced law for a few years, but it wasn't something I enjoyed. I felt very stifled." An innovator and entrepreneur at heart, Tom could not find an appropriate outlet for his creativity, which eventually prompted him to create his first company in Tucson in 1972.

"The Sarver Heart Center is a place where I believe innovation happens daily," Tom says. "Hopefully, Sabina's and my gift

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will provide Dr. Friedman with the resources necessary to become an entrepreneur in the battle against heart failure."

Dr. Friedman says, "The Sarver Heart Center is unique because of its strong program in transplant and device therapy for end-stage heart failure patients developed by Dr. Jack Copeland. This has included the Total Artificial Heart as a bridge to cardiac transplant. However, the center has not had a comprehensive program designed to try to avoid or delay the need for transplant or mechanical device support.

"Our first priority is to develop a program that will improve the management of patients who already have heart failure and to develop a strong working relationship with the cardiothoracic surgeons," Dr. Friedman explains. "Later on, we want to add an outpatient program to identify those at risk of heart failure who can be treated for their risk factors in an attempt to prevent the development of disease. This would obviously avoid the need for recurrent hospitalization and for mechanical device implant or cardiac transplant later on.

"The best part of being a member of the Sarver Heart Center are the people who work here," Dr. Friedman adds. "The physicians are experts in their fields and they are respected by the medical community, both in Tucson and nationally. The support staff is outstanding and they are always ready to help. Working with our colleagues in basic research, we hope to develop translational or 'bench-to-bedside' approaches that will result in even better forms of therapy (See 'Buzzword' on page 11).

"Having a designated, comprehensive and multidisciplinary program for heart failure management will allow for clinical research projects that could lead to more beneficial treatment programs than those currently available. Most importantly, this program will allow the training of cardiology fellows in the management of advanced heart failure so that

"I want to thank Tom and Sabina Sullivan for their generosity and their vision in providing the funds to support a program that will benefit the very large population of patients currently being treated for heart failure. I am hopeful that with this program we can improve the treatment of these patients so they will enjoy an improved quality of life as well as a longer life."

Mark Friedman, MD

Dr. Friedman graduated from New York Medical College with an MD degree in 1971 and completed his residency in internal medicine at The Mount Sinai Hospital in New York. After serving in the U.S. Air Force, he joined The University of Arizona as a cardiology fellow from 1976 to 1978. Later, Dr. Friedman joined a private practice group in Tulsa, Okla., where he not only provided patient care, but also taught medical students and residents in internal medicine, participated in clinical research programs in acute intervention in patients with heart attacks and in patients with heart failure, and helped develop the first cardiac transplant program in Tulsa. In 2005, Sarver Heart Center Director Dr. Ewy recruited him to head the new cardiology program that was being developed at University Physicians Healthcare Hospital. In July 2008, Dr. Friedman joined the Sarver Heart Center as the transplant cardiologist for the cardiac transplant service and to develop a comprehensive heart failure program. ♥

Focus on Heart Failure

By Gordon A. Ewy, MD

It is well known that cardiovascular disease is the most common cause of death and disability in the United States. Advances in medicine have resulted in higher survival rates of individuals with heart attacks, heart surgery and other forms of heart disease. As a result, the number of people living with some form of heart muscle damage is growing. This in turn often results in the development of heart failure. In addition, our population is aging and age is a large factor in developing heart failure. Therefore, the incidence of heart failure is increasing. More than 5 million people in the United States have heart failure, and each year another half-million people are newly diagnosed with this disease.

Forward and backward heart failure

There are two general forms of heart failure: "forward," or systolic heart failure and "backward," or diastolic heart failure. In forward heart failure, the heart is unable to squeeze forcefully enough to pump sufficient amounts of blood to meet the demands of the body. Symptoms of forward heart failure include fatigue and weakness. Backward heart failure develops when the heart muscle becomes stiff and loses the "stretchiness" necessary for obtaining a good fill with blood before each contraction. This condition causes blood to back up into the lungs and the body, which in turn results in shortness of breath and swelling, especially of the ankles. If severe enough, the swelling affects the rest of the legs as well. Forward and backward heart failure often occur together. Patients with heart failure not only suffer from the above-mentioned symptoms, but some are at an increased risk of sudden death.

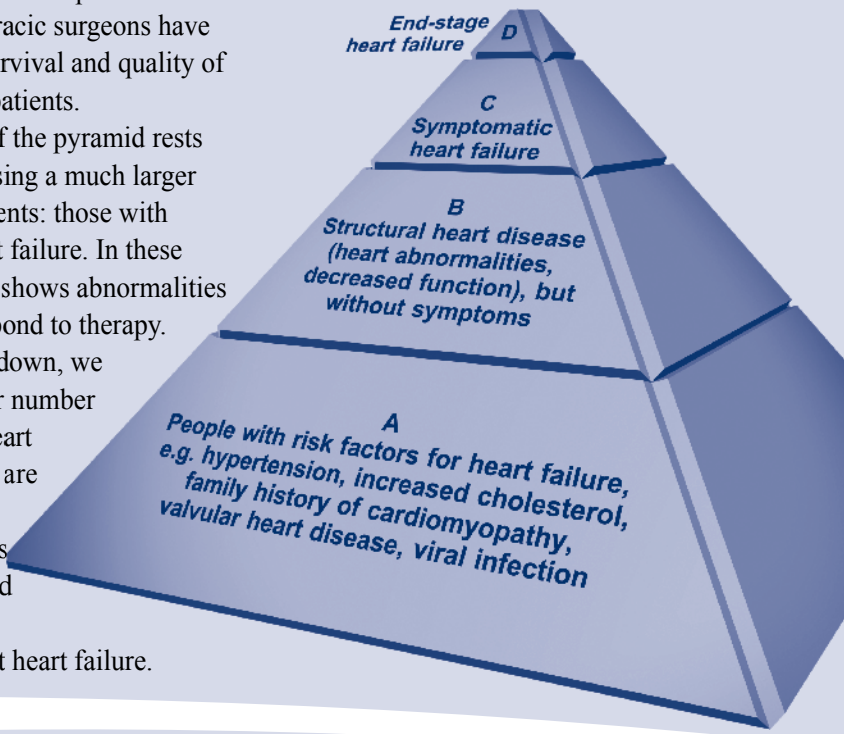
What is not often recognized is that heart failure encompasses several degrees of severity. One can think of this disease and its varied stages as an iceberg or a pyramid made up of four layers. Each layer in the heart failure pyramid is referred to as a different stage of heart failure (see figure). At the tip of this pyramid are patients with the most severe form: end-stage heart failure. Often only the most dramatic therapies can help these patients: a heart-assist device, an artificial heart and, ultimately, a heart transplant. Renowned world leaders in the treatment of patients with end-stage heart failure, Dr. Jack Copeland and his team of cardiothoracic surgeons have set standards in survival and quality of life of transplant patients.

The small tip of the pyramid rests on a layer comprising a much larger population of patients: those with symptomatic heart failure. In these patients, the heart shows abnormalities that generally respond to therapy. One layer further down, we find an even larger number of patients with heart abnormalities that are not severe enough to cause symptoms but if unrecognized and untreated will progress into overt heart failure.

When 'moving up' is not a good thing: A closer look at the heart failure pyramid

Let's climb the pyramid and take a closer look at the different layers along the way. At the base of the heart failure pyramid (stage A) are a vast number of people with risk factors that increase the likelihood of developing heart conditions that can lead to heart failure. These include high blood pressure (hypertension), abnormal cholesterol and increasing age, to name a few. Illustrated in the picture, an extremely large number of individuals feel well but are at risk of developing heart disease that is very likely to lead to heart failure.

The next layer (stage B) includes patients whose hearts show abnormalities, but none severe enough to cause heart failure just yet. Typically, patients who fall into this group have gone through one or more previous heart attacks, or their heart muscle has thickened and become stiffer over years of poorly managed high blood pressure.



The heart failure pyramid: For every patient with advanced heart failure, there are huge numbers of patients with weak or no symptoms

Others may have inherited heart muscle abnormalities, congenital heart defects or abnormal (blocked or leaky) heart valves.

Stage C includes patients with symptomatic heart failure. These patients often experience fatigue, weakness and shortness of breath, especially with exertion, or difficulty breathing after lying in bed for a period of time. Many also complain about rapid weight gain and swelling due to excess fluid in their body.

At the tip of our heart failure pyramid are those suffering from stage D heart failure, the most severe form of the disease. These patients have advanced heart failure, often referred to as end-stage heart failure.

Treatments for heart failure

Those with symptomatic heart failure are treated with a low-salt diet and diuretics, medications that remove the excess fluid. In addition, the doctor may prescribe beta-blockers to lower the heart rate and/or drugs that block the renin-angiotensin-aldosterone system. This class of drugs also brings down blood pressure and helps preserve heart and kidney function. Selected patients may also benefit from digitalis, which stimulates the heart to beat more forcefully.

Given the progressive nature of heart failure, it is easy to see that patients who start out at the bottom of the pyramid eventually might get to the top if nothing is done about their condition. The cardiologists at the Sarver Heart Center have recognized the need to identify those patients with decreased heart function who do not have symptoms.

As can be seen from the large base of the heart failure pyramid, the prevalence of the silent risk in such a large, mostly asymptomatic population is one of our most pressing health concerns. The number of individuals accounting for the "visible" population of heart failure patients literally represents just the tip of the iceberg.

At the Sarver Heart Center, we decided that a new program was needed to address the problem. To lead this program, Mark Friedman, MD was appointed as medical director of the Sarver Heart Center and University Medical Center's heart failure program. He is the recipient of The Tom and Sabina Sullivan, Sr. Endowed Chair for the Prevention and Treatment of Heart Failure. This program is designed to expand our heart failure service and to take care of more patients, not only those diagnosed with heart failure, but also those at risk.

How do we diagnose heart failure?

The major way a physician determines how well the heart is working is by measuring the "ejection fraction," the fraction or percentage of its blood contents that the heart's main pumping chamber (the left ventricle) puts out with each beat. As it contracts, it ejects into the aorta a little less than two-thirds of its contents. Thus, the normal ejection fraction is 55 to 65 percent. Anything lower is reason for concern. Patients in need of heart transplants typically have ejection fractions of less than 20 percent. Patients with ejection fractions less than 35 percent are at risk of sudden death and implantable cardioverter defibrillators (ICDs) often are recommended if they do not improve with therapy. Patients with mild to moderate decreases in their ejection fractions may not experience symptoms, and thus anyone who has had a heart attack or heart valve problems should have their left ventricular ejection fraction checked.

Dr. Jack Copeland and his cardiothoracic surgery team are world-renowned for their pioneering achievements in giving end-stage heart failure patients a new lease on life. Equally important, however, are the comprehensive treatments that our surgeons routinely use to help patients who are at risk of heart failure but still at a point where their progression to end-stage heart failure can be slowed or halted. For example, Dr. Copeland and his team perform valve repairs, fix congenital heart defects and restore heart function using bypass surgery. The particular strength of this cardiothoracic surgery department lies in its interdisciplinary nature: heart surgeons, vascular surgeons, device engineers, anti-coagulation specialists and others all work closely together to offer the best possible treatment tailored to each patient's individual needs.

There are several ways to measure the ejection fraction, most commonly by echocardiograms, but one can determine it during heart catheterization, radionuclide tests, CT angiograms or magnetic resonance imaging (MRI). The physician determines which is best for the individual patient.

One focus of our new heart failure program will be an initiative to encourage individuals with symptoms of heart failure or any individual without symptoms but with a previous heart attack to have their ejection fraction measured so the optimal treatment can be determined.

Sophie Plagnard (left) and Alicia Marcaud, two medical students from the University of Limoges, France, braved the Tucson summer heat and visited UMC and the Sarver Heart Center before starting their fifth year of medical school, which lasts six years in France, in the fall. Every day in August, they shadowed Jack Copeland, MD (center) in the OR, the heart clinic at UMC and the transplant clinic in Phoenix.

"Our university does not have a regular exchange program with Tucson, so we took everything in our own hands and paid our own way," said Alicia. "We especially enjoy the one-on-one experience we get here at UMC. This is a great opportunity for us because compared to the hospital back home, UMC sees a lot more heart transplant patients."

Alicia and Sophie hope to be able to come back during their residency.

"The most exciting experience for me," Sophie said, "was when we had the opportunity to watch an artificial heart implant procedure."

Remodeling: The importance of preventing heart failure early

The reason for this approach is because once there is a decrease in heart muscle function there is a progressive increase in the heart size and progressive decrease in heart muscle function known as "remodeling." Remodeling, if unrecognized and untreated, will progress and lead to symptomatic heart failure. The good news is that if this stage of heart disease is recognized, appropriate medical therapy can often reverse, and at times nearly normalize, heart muscle function. Each cardiologist of the Sarver Heart Center takes care of many such patients.

Medical therapy of patients at risk for heart failure is not easy and requires knowledge and patience on the part of both the physician and the patient. Frequent visits are necessary, during which the physician will start the patient on the appropriate medicines and gradually increase the doses. We often tell such patients that they are not going to be happy with us for a while, as we will see them about every two weeks, and just as they are feeling better, we will increase the dose of medications, which is likely to make them feel worse for a while. However, this kind of "tough love" eventually has the patient feeling much, much better. Many will have their heart function return to near normal or even fully normal. The most helpful medicines in reversing the progressive deterioration of heart muscle function are drugs that block hormones produced by the body in a "self-rescue" attempt to stimulate the heart—but this excessive response is like beating a tired horse. If these hormonal stimulants suddenly are blocked, the "tired horse" will not try as hard and the heart failure gets worse. If, however, these excessive hormonal responses are gradually blocked, in many cases the heart eventually recovers. The management of patients with heart failure takes special training and expertise. If, in spite of intensive medical therapy, the heart function does not improve, these patients are candidates for implantable cardioverter defibrillators (ICDs) that prevent sudden death (see the article, "The Emergency Room in Your Chest" on page 8 in this issue).

The paradox is that one can have a normal ejection fraction and still have heart failure due to diastolic failure. Diastolic failure, or backward failure, is most common in women and the elderly. It leads to fluid backing up in the lungs, causing shortness of breath, and fluid backing up into the body, causing weight gain and swelling of the ankles and often the legs. The reason the symptoms and signs of diastolic failure are similar to some of those of systolic, or forward failure is that almost all patients with systolic failure have a varying degree of diastolic or backward failure. ♥

For more information about heart failure, see "'F' is for Failure – Heart Failure" in the Winter 2006/07 issue of the Sarver

University Medical Center among Nation's Top Five Teaching Hospitals for Quality

University Medical Center has received a prestigious Leadership Quality Award from the University HealthSystem Consortium (UHC) after it scored among the top five teaching hospitals in the nation in the 2008 UHC Quality and Accountability Survey.

UMC and four other teaching hospitals – Methodist Hospital in Indianapolis, Rush University Medical Center in Chicago, Houston's St. Luke's Episcopal Hospital and the University of Wisconsin Hospital and Clinics – emerged as the nation's top-scoring performers in the survey.

Last year UMC ranked 11th in the same survey. The year before, its rank was 17th. "We're proud of it, but I say that with caution because we know we are being re-evaluated and rejudged every minute of every day," said Andy Theodorou, MD, co-director of the UMC Center for Patient Quality and Safety. "We look at it as a reflection of our dedication throughout the institution."

The UHC Quality and Accountability Survey measured data from 88 academic medical centers on safety, timeliness, effectiveness, efficiency, equity and patient-centeredness. UMC scored particularly well on the mortality portion of the analysis, ranking third for its low mortality rate by measuring deaths in 28 areas, including transplants, cardiology, neurology, neurosurgery and trauma. ♥

‘If a person can, they should give back.’

–William ‘Bill’ Swahlen

A longtime Arizona couple reflects on their time at The University of Arizona and their philanthropy

Bill and Marian Swahlen have a clear purpose in mind when they make a gift to the Arizona Health Sciences Center. Together, the couple supports the Sarver Heart Center with an annual contribution that is close to their hearts. “My father had heart disease,” says Marian, “and Bill does, too.” Bill says, “We admire the work at The University of Arizona. It has very strong programs in the areas we are interested in and we hope our gifts will help in some way to improve the quality of life for others.”

Longtime Arizonans

“I’m a third-generation Arizonan”, says Marian. “My family didn’t homestead, but they did buy a homestead from a gentleman who had cleared the desert brush away, given up and headed back east. Bill adds, “She still considers me a transplant even though I got here in 1937!”

Bill and Marian Swahlen

Bill and Marian met on the UA campus in 1939. “We were at a Pi Phi/ Sigma Phi exchange dinner,” Marian recalls. “When I met Marian I knew that she would be the girl for me,” says Bill. “I quickly started dating her so no other would have the chance to steal her!”

They remained college sweethearts and were soon engaged. “Bill had graduated when World War II broke out and could enlist in the Navy V7 Officer Training Program.” Marian says, “I was an English major but needed to find a way to graduate early.” Marian’s mother also had a piece of advice. “She told me that I had better graduate with something that would earn a living.” After evaluating all her credits, Marian realized she could do her practice teaching at Sam Hughes Elementary School and complete a degree in education in her junior year.

Shortly after Marian graduated, the couple wed and moved to San Francisco as Bill was immediately assigned to a destroyer in the Pacific as torpedo officer. Before his years of service were over, Bill served aboard three destroyers, one of which was sunk. “When I realized that our ship was sinking, I grabbed my picture of Marian and tucked it under my vest,” says Bill

Once the war was over, Bill returned to San Francisco and their journey together lead them back to Tucson, where Bill worked for the UA Cooperative Extension Program. “I couldn’t make a living teaching to save my life,” Marian explains,“and Bill really wanted to be a rancher.” Their stay in Tucson would last only a year before they moved to Tempe, Ariz., a short distance from Marian’s hometown, Mesa. In the late 1940s Tempe was quite different. The first Swahlen Ranch now has been subdivided and commercialized into a downtown business area. It became clear that Bill and Marian would have to find a new area to pursue their dream of cattle ranching. “I found a property in Idaho that was absolutely perfect,” Bill says. “It had water and grazing areas but there was one problem: Marian would only move on the condition that we also buy a home in her beloved Arizona.” They still own their townhome in what is now downtown Scottsdale.

When the time came to sell the ranch decades later, Bill and Marian found a buyer who loved the land as much as they did. “Our children spent time on our Arizona farm and Idaho ranch,” says Bill, “but it was clear that they didn’t have the same interest in ranching as I did, so finding someone who wouldn’t develop the area was just what we had hoped for. Once we sold the ranch we moved back to Arizona permanently.”

Their first gift to The University of Arizona remains very special to both of them. “We wanted to support our alma mater,” says Bill. “If a person can, they should give back.” Marian adds, “The University truly changed my life. Our gifts are in hope that cures can be found. They won’t be here in time for Bill and me, but for future generations.” ♥

The Emergency Room in Your Chest

A research team at the Sarver Heart Center is spearheading a clinical study to predict who is at risk from sudden cardiac death. Non-invasive imaging technology is key and could save the health care industry millions.

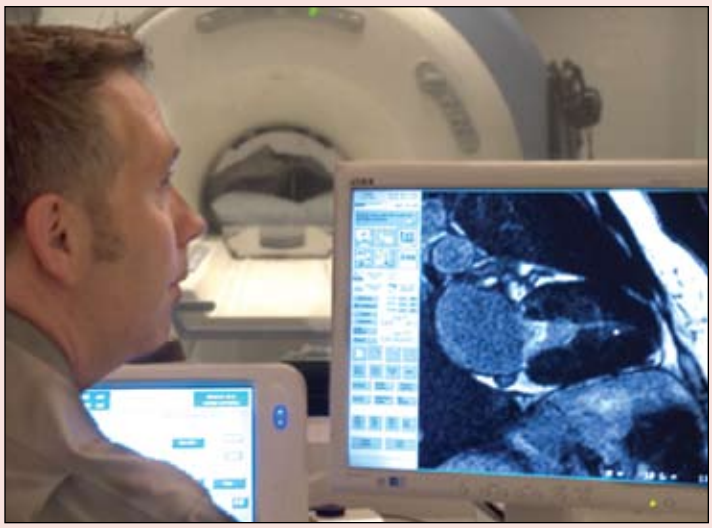


Photo: COM Information Technology Services

Vincent L. Sorrell, MD, uses cardiac magnetic resonance imaging (CMR), among other techniques, to predict a patient's risk of sudden death.

On a February morning in 2005, Steven Mark Gootter began his day like any other. He got up early, rounded up the family dog and headed out for a morning jog. That was the last time his wife, their two young children and the rest of his family and friends would see him alive. Steve never came home again–sudden cardiac death had claimed the life of this vibrant, athletic, healthy 42-year-old man.

Before today is over, almost 1,000 people in the United States alone will share Steven's fate – and die suddenly from heart disease. Sarver Heart Center researcher and physician **Vincent L. Sorrell, MD** has assembled an interdisciplinary team to spearhead an effort to fight sudden cardiac death. This groundbreaking research is made possible through a research grant awarded to Dr. Sorrell from the Steven M. Gootter Foundation, a Tucson initiative to fight sudden cardiac death.

Implantable cardiac defibrillator devices (ICDs), dubbed "the emergency room in your chest," have proven to be lifesavers because they detect heart rhythm abnormalities and shock the heart back into a normal rhythm. However, doctors struggle to accurately predict who is at risk from sudden cardiac arrest and who is not.

"In certain patient subgroups, only 5 percent of implanted defibrillators ever fire," says Dr. Sorrell. "In other words, 95 percent of individuals with ICDs may not need them."

Over the course of a lifetime, the costs of the device, the implant procedure and follow-up easily can exceed $150,000. Add to that the medical risks associated with any surgical procedure and it becomes obvious that ICDs are a blessing for a few patients that really need them but pose an immense burden on the health care system when implanted in someone whose heart never triggers the device.

Dr. Sorrell's team has launched a study to investigate new ways of identifying the patients who most likely would benefit from an ICD. At the heart of the new approach lies a sophisticated, non-invasive imaging technology called cardiac magnetic resonance imaging, or CMR. CMR uses a powerful magnetic field and computer software to construct high-resolution, three-dimensional images of the heart.

"With CMR, there are no unwanted risks or side effects, unlike those associated with other imaging techniques like CT scans or nuclear stress tests, which involve radiation or contrast agents that are toxic to the kidneys," Dr. Sorrell points out. "The patient goes into the tube, and within 30-60 minutes we have an image that allows us to make a pretty accurate assessment of the size and location of scarring in the heart muscle."

More importantly, the UA researchers believe that conventional imaging tests systematically miss patients who are at severe risk for sudden cardiac death while singling out patients for ICD implantation who do not face any substantial risk at all.

"Under the current parameters, a patient with extensive scarring in the heart, for example due to a previous heart attack, likely would be considered a candidate for an ICD," says Dr. Sorrell. "At the same time, another patient, whose heart shows no scarring, would receive a pat on the back and be told, 'You're in great shape.'

"With our high-resolution CMR imaging tests, we sometimes find patients who may be previously cleared but actually have unsuspected scarring in their heart, while others, whose hearts are riddled with scar tissue, may actually face an extremely low risk of sudden cardiac death," Dr. Sorrell says. "Based on preliminary data, we believe it is the intermediate-sized scar that predicts the risk for fatal heart rhythm disturbances, and that large, major scars alter heart function, but pose less of a risk."

Dr. Sorrell's team has started a one-of-a-kind registry to systematically identify patients at risk based predominantly on non-invasive CMR imaging. The results obtained so far look promising and could open the path to a paradigm shift, ultimately saving the lives of individuals that otherwise would die from sudden cardiac death, and potentially saving millions in health care costs at the same time. ♥

A Life of Hard Work Leads to a Gift in Hopes of a Better Life for Others

Sandra Brooks remembers her great-aunt, Marjorie 'Midge' Hornbeck, who lived through two world wars, the depression and a childhood filled with hardship.

"We were very poor," Midge Hornbeck said about her childhood. "I had to work, there was no choice." When she was 6 years old, her mother, Alice McCann, died, leaving behind seven children. Born on April 26, 1913, Midge was a happy child and loved to talk, which got her into trouble on more than one occasion with her father. She said, "I got into so much trouble because I did not know when to shut up." She also liked to whistle around the house, much to her father's disapproval. After all, children were supposed to be seen but not heard. Midge told stories of how she used to break pencils in several pieces to share them with her siblings for school. She started working in a shoe factory while she was under age, and when the inspectors came, she hid in a closet. "I was best at putting in the tongues," said Midge when she reminisced on the years in the factory. All her life, the love for good, well-made shoes would stick with her.

When WWII came and the men joined the war effort, she worked on fighter planes, along with many other women. When the men returned after the war and wanted their jobs back, the women would not give them up. Midge said, "I've worked all my life." Even at age 90, she could be seen pulling weeds in her yard.

Midge met her future husband of 54 years, Walter Hornbeck, at the shoe factory, where he worked after his discharge from the U.S. Army. "He was so handsome, " she remembers. "He would sit on the edge of my desk and chat with me." Walter eventually asked her out and they were married in 1946. The couple enjoyed camping and fishing. Walter suffered from asthma and the desert was believed to be the cure, so they moved from Columbus, Ohio, to Phoenix in 1953. While in Phoenix, they owned a grocery store and an exterminating business. Later, they moved on to Morenci, Ariz., where Walter worked as a carpenter until he retired when the mine went on strike.

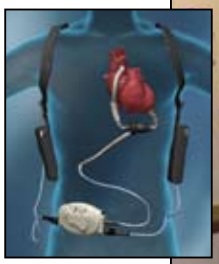
Having no children of their own, Midge and Walter built their family around their dogs, which they loved dearly. Their door was always open to take care of families in need. Even on a limited income, the couple was always there to help and share whatever they had. No one was turned away. Midge outlived her husband, who died on Feb. 20, 2000, by seven years, until she passed away on Dec. 9, 2007.

"Midge never felt comfortable making big gifts while she was alive. She was a child of the Great Depression and always wanted to be sure she had enough," recalls her great-niece Sandra. "When she died she left her life's savings to charities that were important to her. Her beloved husband had died as a result of heart disease, so supporting the Sarver Heart Center seemed only natural. All her life she tried to take care of others – this gift is her way of continuing her legacy."

For more information on giving opportunities, including estate planning or charitable gift annuities, please contact the Sarver Heart Center Office of Development at (800) 665-2328. ♥

A Man without a Pulse

A heart failure patient receives University Medical Center's first HeartMate II ventricular assist device



43-year old Rafael Rivera takes a walk around the hospital just days after he became the first patient at UMC to receive the HeartMate II assist device.

Battery packs worn in holsters allow the patient to leave the hospital and resume daily activities instead of being tethered to a machine. (Reprinted with permission from Thoratec Corp.)

Although he has no detectable pulse, Rafael Rivera is doing great. Only a few days after surgeons at University Medical Center opened his chest and attached a relatively new mechanical heart-assist device to his heart, Rivera took walks around the hospital.

On July 11, Jack G. Copeland, MD, chief of cardiothoracic surgery at UMC and co-director of the Sarver Heart Center, and his team implanted the HeartMate II as a bridge-to-transplant device.

This marks the first time the HeartMate II has been used at UMC. The device takes over the pumping work from Rivera's heart, restoring blood flow and preventing deleterious consequences of heart failure, such as multiple organ failure.

Unlike most other heart-assist devices, in which pulses of pressurized air rhythmically pump the blood around the body, the small and lightweight HeartMate II houses a fast-spinning turbine that circulates the blood continuously. Because the device generates a continuous blood flow, Rivera has almost no detectible pulse.

"Mr. Rivera was in severe heart failure and we had to buy him time until he can receive a heart transplant," says Dr. Copeland. "Because of certain antibodies in his immune system, he will require a highly specific match for a donor heart, and that can take a while." ♥

A Patch for Broken Hearts

Sarver Heart Center Physician and Researcher Steven Goldman, MD, studies how cells could aid in healing damaged hearts

Steven Goldman, MD, UA College of Medicine professor of internal medicine and chief of cardiology at the Southern Arizona Veterans Administration Health Care System (SAVAHCS), was selected as recipient of this year's Faculty Science Forum Founders Day award. Winner of numerous awards for teaching, Dr. Goldman is noted for his translational research, his mentoring skills and his ability to inspire students and trainees. He joined the UA and the Tucson VA Hospital in 1975 and founded the laboratory and clinical-based Cardiology Research Program at SAVAHCS in 1977. His basic research focuses on heart failure and has direct clinical applications, including the development of new drugs, new approaches and clinical trials of new treatments for congestive heart failure. Dr. Goldman has served as national principal investigator on numerous trials through the VA Cooperative Studies Program. Sarver Heart Center Director Gordon A. Ewy, MD, said: "Dr. Goldman is a most deserving recipient for this award, and we are proud to count him as a member of the Section of Cardiology and the Sarver Heart Center."

Only a few weeks earlier, Dr. Goldman was awarded the Sarver Heart Center Special Service Award. Specifically, the award recognized Dr. Goldman for "outstanding service to the United States by serving as a physician in the U.S. Marine Corps and by caring for our veterans, for his service to the University through scientific discoveries and for outstanding service to the UA College of Medicine by motivating, teaching and inspiring medical students, residents, fellows and colleagues."

In the following interview, Dr. Goldman talks about his research and the implications for potential new therapies.

Q: Dr. Goldman, in a nutshell, what does your research focus on?

Dr. Goldman: We are studying the use of cell-based therapy to repair heart tissue that was damaged by a heart attack. Our results are promising – we hope to be able to prevent or even reverse heart failure some day.

Q: What happens to the heart muscle during a heart attack?

Dr. Goldman: A heart attack occurs when a coronary artery, one of the blood vessels supplying the heart muscle with blood, clogs up and blood flow to the muscle is blocked. This happens when a cholesterol plaque inside a coronary ruptures. This leads to an inflammatory reaction in the inner lining of the blood vessel, and a blood clot forms. Keep in mind that the heart muscle squeezes 100,000 times a day. To be able to do that, the muscle tissue depends on a steady supply of energy and oxygen. If a coronary blockage cuts off the supply, the muscle tissue begins to die. Once a heart attack has occurred, scar tissue replaces the muscle in the affected area. To compensate for the lost muscle mass, the heart begins a process that we call remodeling: The muscle in the unaffected areas of the heart stretch more and work harder to pick up the slack left by the damaged parts of the heart muscle.

Q: But there is a problem with remodeling.

Dr. Goldman: Yes, remodeling helps the heart to cope in the short term but is bad in the long run because the organ can't keep up with the workload. The healthy, undamaged muscle portions overwork themselves and start to wear out. As a result, the patient develops heart failure.

Q: What can be done about that?

Dr. Goldman: Currently, there is no good way to repair damaged heart muscle. There has been a lot of enthusiasm for using stem cells to cure heart failure. A number of clinical trials have been undertaken in the hope of stem cells replacing the dead tissue and restoring the heart's capabilities to where they were before the heart attack.

Q: With what results?

Dr. Goldman: The results have been largely disappointing. For reasons that nobody really understands at this point, few of the cells survive when injected into the infarcted heart. This happens both in animal models and human patients. Rejection does not appear to be the issue, as most of these studies used bone marrow cells taken from the same patient.

Q: Why is it so difficult for the cells to survive?

Dr. Goldman: We think that by injecting cells into a damaged area of the heart, they end up in an environment that is probably not a very good one for them to thrive in. Scar tissue offers poor blood supply and weak structural support for new cells to attach, survive and grow. If we want those cells to survive and, ultimately, regenerate new, healthy heart muscle tissue to replace the damaged parts, we need to make sure they have a new blood supply and a structural support system, in this case connective tissue that the cells can adhere to and that helps them form new tissue.

Q: You developed a promising solution to the problem. Can you tell us more?

Dr. Goldman: We use a patch, a micro-mesh made from synthetic fibers that gives the cells a scaffold to adhere to.

The material is essentially made from the same kind of material used as suture. We incubate the patches with cells in a sterile cell culture system, so the new cells can colonize the mesh until the whole system is ready to be implanted into a damaged heart. To do this, we drape the patch over the damaged part of the heart muscle. As the cells multiply and spread across the mesh, they embed themselves in a self-produced matrix that offers them support and facilitates chemical communication with other cells. This is a fairly new technology and we work closely with a variety of industry partners.

Q: What results has your research group achieved with the patch?

Dr. Goldman: We found that the patch leads to the formation of new blood vessels and improved blood flow in the damaged region of the left ventricle, which is the part of the heart that pumps blood into the body's main arteries. With the patch, we have been able to increase the ejection fraction, the percentage of blood the heart squeezes out with each beat. If we implant the patch immediately after a heart attack, the patch also reverses the detrimental remodeling of the heart that I mentioned earlier. All this tells us that placing a patch with cultivated cells on infarcted heart muscle could be a new and more promising approach to cell-based therapy for heart failure after a heart attack compared to the injection of stem cells alone.

Q: What implications does your research have for clinical applications in human patients?

Dr. Goldman: There is potential for clinical application of the patch. Currently, we are involved in two phase-I clinical trials, one in which patients receive the patch during bypass surgery and the other in patients receiving a left ventricular assist device. Our work has a very translational emphasis. This kind of research is only possible if many scientists with different backgrounds and expertise work together on the same problem. In this day and age, no single investigator has the knowledge or the resources to get anything done that produces meaningful results. Our lab collaborates with many scientists at the UA. Just to give you an example, I work closely with Carol Gregorio, who leads the Heart Center's Molecular Cardiovascular Research Program, and Joe Bahl; both are experts in cultivating cell and help us with that part of the project. We can do this work because of the unique environment that the UA Sarver Heart Center and the VA provide to us. ♥

Steven Goldman, MD, discusses the results of a cell culture experiment with Elizabeth Juneman, MD, (right), Chief Resident Tracy Hagerty, MD and pre-doctoral student Jordan Lancaster (front).

BUZZWORD

Translational or bench-to-bedside medicine: The idea is to turn scientific discoveries into new therapies as quickly as possible. Translational medicine requires a highly interdisciplinary work environment, in which basic researchers, technicians and physicians can directly interact with each other and share their expertise and diverse ways of thinking toward a common goal. At the heart of a world-renown research university and UMC, ranked fifth best teaching hospital in the nation, the Sarver Heart Center provides the kind of environment that makes translational research not only possible but holds the potential for breakthroughs at the lab bench that will offer truly innovative therapies for the bedside.

Join us for

The Green Valley Lecture Series

January 15

Keep the Beat: Electrophysiology of the Heart
Julia Indik, MD, PhD

February 19

What Women Need to Know about Heart Disease
Lorraine L. Mackstaller, MD

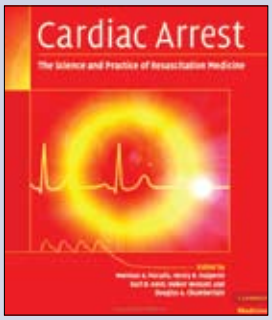
March 19

Let's Talk about Stroke: Risks and Prevention
Leslie Ritter, PhD

Free and open to the public.
Presentations are held
Thursdays at 10 a.m.
at Canoa Hills Social Center,
3660 S. Camino del Sol, Green Valley.
No reservation required.

For more information please call (520) 626-3766

Karl Kern, MD, a leading researcher in the Sarver Heart Center Resuscitation Research Group, has co-authored the most comprehensive reference in advanced life support and resuscitation medicine. The book has won the British Medical Association's "Book of the Year" prize in the cardiology section.



Praise for ***Cardiac Arrest – The Science and Practice of Resuscitation Medicine***:

"… It is a tribute to the editors of this book, and the contributors they have selected, that they have managed to produce a book of enormous quality on the science of resuscitation medicine."

– The Lancet

"This excellent book, the first of its kind in the field of cardiac arrest, provides a balance of theoretical and clinical information. It achieves a level of authority and sophistication well beyond that of the advanced cardiac life support guidelines and will be of considerable use to all those practicing or teaching clinical resuscitation."

– The New England Journal of Medicine

"The book has virtually everything one would ever want to know about the causes of cardiac arrest, the applied physiology and its treatment. Physicians and nurses involved in the management of critically ill or injured patients should have *Cardiac Arrest* in their personal libraries for ready reference."

– Resuscitation

'No' is Not in Her Vocabulary

Lynn McLaury, accounts receivable operations coordinator with The University of Arizona Foundation, has received the third annual Brian Bateman Superb Service Award for her consistent and outstanding support to the Sarver Heart Center Development Office. The award recognizes staff members who go above and beyond the call of duty for patients and friends of the Sarver Heart Center. Clint McCall, director of development at the Sarver Heart Center, says of Lynn, "I don't think that Lynn has the word 'no' in her vocabulary. Anytime our office calls for assistance with a gift, Lynn always responds quickly and, more importantly, with the best interest of the donor in mind. She is a true asset for The University of Arizona and the UA Foundation." ♥

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