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SOLUTIONS TO COMPLEX ANEURYSMS
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3 LETTER FROM THE CHIEF MEDICAL EDITOR
Manish Mehta, MD, MPH, Center for Vascular Awareness, Albany, NY

4 NEW TREATMENT FOR INOPERABLE PATIENTS
Augustin DeLago, MD, Albany Medical Center, Albany, NY

6 ANESTHESIA DURING TAVI
Saroj Pani, MD, Albany Medical Center, Albany, NY

8 BEYOND CONGESTIVE HEART FAILURE: DEVICES IMPROVING HEART FUNCTION
Niloo Edwards, MD, St. Peter’s Hospital, Albany, NY

11 THE HEALTHY HEART: AVOIDING CORONARY ARTERY DISEASE
Lewis Britton, MD, Albany Medical Center, Albany, NY

13 A PATIENT’S STORY: EUGENE
Sharon Cillis, RN, Center for Vascular Awareness, Albany, NY

15 INNOVATIONS IN AORTIC ANEURYSM REPAIR
Manish Mehta, MD, The Vascular Group, Albany, NY

17 THE NEXT FRONTIER: BIODEGRADABLE STENTS AND DRUG ELUTION
Sean P. Lyden, MD, FACS, The Cleveland Clinic Foundation, Cleveland, OH

19 HEALTHY LEGS FOR LIFE
Melissa D. Shah, MD, Albany Medical Center, Albany, NY

21 HISTORY MAKES MEDICINE: THE EVOLUTION OF INNOVATION
Christine Sawh, CRC & Manish Mehta, MD, MPH, The Vascular Group, Albany, NY

23 V-HEALTHY, TELL 2 PEOPLE: A COMMUNITY OUTREACH PROGRAM
John B. Taggert, MD, The Vascular Group, Albany, NY

24 L-VAD: A TASTE OF BIONIC LIFE
Benita Zahn, MS, WNYT, Albany, NY
Heart and Vascular Innovations: The Next Frontier

While watching the 2009 film “Star Trek” which takes place in stardate twenty two sixty-six, just about 250 years from today, it was obvious that aboard the USS Enterprise Dr. Leonard “Bones” McCoy could diagnose and treat just about anything with an instrument shaped like a pen resembling a ‘magic wand’. So the obvious question is: "How can we get from here to there?"

Through the history of mankind, innovations have been the fundamental necessities for change to happen in cardiovascular medicine. It is hard to imagine that since 800-600 BC when Sushruta first figured out how successfully tie a blood vessel and stop hemorrhage, evolution of cardiovascular medicine was at a standstill until the 20th century when Alexis Carrel won the Nobel Prize for perfecting the arterial anastomosis; the fundamental necessities for coronary artery bypass, renal transplant etc. As scarce as innovation was over these 2,500 years, in the past quarter century, advances in cardiac and vascular health care, driven by innovation and technology, have had a significant impact on our ability to diagnose and treat complex cardiovascular problems.

From the days of significant morbidity and mortality related to surgery for aneurysm repair, to treatment of peripheral arterial occlusive disease, to heart bypass, healthcare providers and facilities have developed infrastructures that are technologically advanced and minimally invasive. Over the next decade, these modern systems will continue to reshape vascular and cardiac healthcare delivery and improve patient outcomes. Innovation will focus not just on better drugs and devices for the diagnosis and treatment of cardiac and vascular disease but also on information technology (the Apple iPhone, for example) that allows portability, remote monitoring, and self-management of health information.

This issue of V-Aware will focus on the impact of recent innovations in cardiac and vascular surgery, and we are delighted to have the contributions from experts in the field of cardiovascular medicine and surgery. Dr. Agustin DeLago provides his insights in transcatheter aortic valve implantation (TAVI); a procedure that has been recently approved by the FDA for patients with severe aortic valve stenosis that are considered to be inoperable via standard ‘open heart’ surgical approach. Next, Dr. Saroj Pani takes us through the special anesthesia considerations when caring for patients with aortic valve stenosis requiring TAVI. Dr. Niloo Edwards focuses his discussion on ventricular assist devices and their use for treating patients with congestive heart failure. We have the privilege of sharing the personal story of a patient, Coach Eugene, who recently underwent one of the first TAVI procedures performed in the United States since the device gained FDA approval. Drs. Lewis Britton and Melissa Shah tell us how we can make a positive impact on our cardiovascular health and maintain a healthy heart and healthy legs. In my article, I introduce innovations that are impacting treatment of complex aortic aneurysms and Dr. Sean Lyden from Cleveland Clinic highlights the next generation of minimally invasive devices for the treatment of peripheral arterial disease. The Vascular Group research team provides perspective on the importance of research and discovery, and Benita Zahn shares the story of Dave Morey, a recipient of a left ventricular assist device.

I hope you enjoy this issue of V-Aware. Previous issues can be found on our Web site, www.vAware.org. As always, we look forward to your comments and suggestions. Please feel free to write to us at info@vAware.org.

Warmest regards,

Manish Mehta, MD, MPH
President and CEO of the Center for Vascular Awareness, Inc., in Albany, NY
The aortic valve is the last valve in the heart that the blood flows through before being ejected to the rest of the body.

Typically, this valve is a very pliable, flexible structure. Over time, and in certain patient populations, however, the valve becomes fibrotic and calcified. This condition is known as aortic stenosis, characterized by decreased motion of the aortic valve leaflets.

Aortic stenosis is a disease of the elderly, occurring mainly in patients over the age of 75. The symptoms of significant aortic stenosis are usually shortness of breath, chest pain and, at times, fainting. Not all patients have these symptoms, and there are several different degrees of aortic stenosis classified as mild, moderate, or severe.

Once symptoms occur, aortic stenosis is considered significant. Left untreated, patients with significant aortic stenosis have a mortality rate as high as 50%.

HELP FOR THE HIGH RISK
Over 1.5 million people in the United States have aortic stenosis, and out of this population, one-quarter million have a severe debilitating form requiring treatment. When symptoms become significant, patients are traditionally recommended to have an open heart surgical procedure called aortic valve replacement (AVR). This approach affords most patients an excellent prognosis and a good long-term outcome. Unfortunately, there is a subgroup of patients that cannot be treated with traditional AVR surgery. These patients are elderly with significant other medical problems, making them significantly high risk for open surgery.

In November 2011, the Food and Drug Administration approved the SAPIEN transcatheter heart valve (Edwards Lifesciences, Irvine, CA) for patients with severe aortic stenosis who are not suitable
candidates for AVR surgery. The Food and Drug Administration approved this valve based on the Placement of Aortic Transcatheter Valve trial performed between 2007 and 2009, which enlisted 21 centers in the United States. The researchers looked at 358 patients who were considered unsuitable candidates for traditional AVR and randomized them to receive either transcatheter aortic valve implantation (TAVI) or treatment with balloon valvuloplasty and medication. At 1 year, the mortality rate in the TAVI group was 30%, significantly lower than the 50% mortality rate of the patients that underwent valvuloplasty and received medical therapy.

The SAPIEN valve is a tissue-based prosthesis sewn onto a stent structure. The valve is delivered into the heart without compromising the chest via small incisions in the groin area. The new valve is deployed across the diseased aortic valve and stented into position. Once in place, the SAPIEN valve provides an excellent long-term prognosis for patients who were unable to undergo traditional AVR surgery.

The TAVI procedure is not without its own complications, however. Unfortunately, the stroke rate for this procedure can be as high as 5% to 8%. Vascular complication rates, meaning potential damage to leg arteries at the insertion site, can be as high as 15%.

It is important to remember that the overall mortality improvement of 20% at 1 year is significant for this group of patients who have no alternative treatment.

**STRUCTURAL HEART TEAM**

Albany Medical Center Hospital was one of the first locations in the United States approved for the commercialization and implantation of the SAPIEN valve. In December 2011, our multidisciplinary structural heart team treated the first TAVI patients at Albany Medical Center with great success. We have since been able to offer this treatment to many others. It is our fundamental belief that the excellent results we achieve are due to our collaborative efforts and our multidisciplinary team approach to patients with aortic valve disease.

Our structural heart team consists of cardiothoracic surgeons, vascular surgeons, invasive and noninvasive cardiologists, cardiac anesthesiologists, and a significant ancillary staff consisting of nurses, cardiovascular technicians, and radiology technicians. We evaluate patients at every step in the process, enabling us to individualize and customize each treatment plan.

**WHO CAN BENEFIT**

The SAPIEN valve for TAVI is currently approved for patients that are otherwise considered inoperable by traditional 'open heart' surgical procedures. This procedure gives hope to the many patients that would otherwise have no other treatment option. Today, most low-risk patients who have significant aortic valve stenosis are best served with traditional AVR surgery. Further studies evaluating TAVI’s role in low-risk patients will determine the device’s evolving role for treating severe aortic valve stenosis. It is likely that continued improvements in technology will broaden the use of this less-invasive procedure in the near future.

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**Ask Your Doctor**

1. If I do not want to undergo open heart surgery, will I be considered a candidate for TAVI?
2. How long is the hospital stay after a TAVI procedure?
3. How long will the new valves last?
The big day came on a bright Wednesday morning in December 2011. A minimally invasive transcatheter aortic valve implantation (TAVI) procedure had been planned at Albany Medical Center.

The steps had been well rehearsed by a multidisciplinary structural heart team including cardiologists, cardiothoracic surgeons, vascular surgeons, and cardiac anesthesiologists. Our group went over every detail one last time at 7:00 AM.

MAKING HISTORY

The patient was an 86-year-old gentleman who was suffering from crippling symptoms of heart failure due to severe narrowing of the aortic valve in his heart. This charming individual wanted to get back to the good quality of life he had enjoyed only a year ago.

On the morning of the procedure, our patient laid in a stretcher that was rolled to the operating room by the anesthesia team.

Involvement of the cardiac anesthesiologist before, during, and after any procedure can be lifesaving for the patient. For this particular case, we had selected a general anesthetic; not only would this type of anesthesia keep the patient comfortable, it would also allow control of his airway, breathing, and circulation while the operation was in progress. The fundamental anesthesia care for this patient was no different than what we practice daily in the operating room with one exception: This was to be one of the first TAVI procedures performed in the United States since the Food and Drug Administration’s approval of the SAPIEN transcatheter aortic valve (Edwards Lifesciences, Irvine, CA) just one month prior.

The procedure was scheduled to take place in a hybrid operating room with both surgical and fluoroscopic capabilities. The morning began as the anesthesia team prepared
the patient for the TAVI procedure. Once the patient was asleep under general anesthesia, arterial and venous catheters were put in place, enabling us to monitor his vital hemodynamics and infuse intravenous fluids and drugs. During the procedure, a special heart ultrasound test known as a transesophageal echocardiogram allowed us a close-up view of aortic valve function before and after implanting the new valve. All through the operation, there was a steady stream of cross-communication between the surgeons and the anesthesia team. We are a close-knit group and rely on one another to carry out the procedure successfully.

**STEP BY STEP**

Depending on what the patient’s anatomy allows, access to the aortic valve is obtained from either the femoral arteries in the groin, the iliac arteries in the pelvis, or sometimes via adjunctive routes from arteries in the arms or neck. Steps to replacing the aortic valve include access, navigation, aortic valve angioplasty, taking precise hemodynamic and structural valve measurements, and, finally, implanting the device. During these steps, the patient’s heart rate, blood pressure, cardiac output, and respiration are well controlled and manipulated to allow for safe insertion and implantation of the new valve. The synchrony of these steps, which might only last 15 to 30 minutes, has to be seamless for precision, and this is where the collaboration among various team members is vital and well rehearsed.

Short-acting anesthetic drugs allow the patient to recover quickly, and often patients are weaned off the anesthesia right in the operating room not long after the procedure’s completion. Patients are transferred to the intensive care unit, where experienced nursing staff members take over their care. In just a little while, the patient is fully awake and talking. In the postoperative period, a limited amount of pain medications are needed. Over the next couple of days, the patient starts the process of rehabilitation and is discharged home.

**A NEW OPTION**

Severe aortic stenosis (narrowing) places an increased demand on the heart and decreases the amount of oxygen delivered to the body. This condition is associated with high morbidity and mortality. The treatment for severe aortic stenosis is surgical replacement of the aortic valve. The decision to undergo surgery is based on age, lifestyle, and any coexisting diseases.

TAVI has emerged as an option for patients who are currently considered inoperable via standard open heart surgical approach. This catheter-based technology avoids large incisions and does not require the use of a heart-lung machine. Studies have shown that the procedure improves patients’ quality of life and longevity. TAVI is also associated, however, with an increased risk of strokes and vascular complications. In addition, the long-term durability of the replacement valve is not known.

The SAPIEN heart valve is a tissue valve supported on a stent. The calcium bed of the native valve and the outward force of the blood flow hold the valve secure. The new valve is delivered via a catheter through arteries that lead to the heart or, alternatively, directly to the left ventricular apex of the heart (requiring an incision in the chest). Patients are thoroughly screened for this procedure by cardiologists and cardiothoracic and vascular surgeons. Preoperative screening involves echocardiography, angiography, and computed tomography scans.

The anesthesiologist is involved in all aspects of perioperative care. A functional assessment is done preoperatively, and all medications and laboratory tests are reviewed. Consent for an anesthetic and healthcare directives are discussed. A general anesthetic is usually preferred; however, in certain situations, the procedure can be performed using regional anesthesia and sedation with anesthesia on standby. If complications arise during the procedure, the anesthesiologist is always prepared to convert to a general anesthetic.

**A TEAM EFFORT**

Technological advances and techniques have made the new TAVI option possible. More important, however, is the human ingenuity, care, and compassion involved. The procedure requires a multidisciplinary team composed of interventional cardiologists, vascular surgeons, cardiothoracic surgeons, cardiac anesthesiologists, dedicated catheterization lab staff, operating room staff, and intensive care staff. Each member is an expert in his or her own field and has a specific responsibility; success depends on the collaboration and cooperation of every person on the team.

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**Ask Your Doctor**

1. How can I modify my risk factors for developing aortic aneurysms?
2. How can I be tested for aortic aneurysms?
3. When do I need to see a vascular specialist?
Congestive heart failure (CHF) is a problem that affects every organ in the body.

When the heart cannot pump strongly enough to meet the body’s needs, the kidneys do not function well, and excess fluid accumulates in the lungs and legs. As a consequence, the body gets “congested” with fluid, resulting in leg swelling and shortness of breath.

CHF affects almost 5 million people in the United States, and every year, almost half a million new individuals are diagnosed with this disease.

It is the most frequent diagnosis in hospital admissions for patients over age 65. Unfortunately, half the patients with CHF will die within 5 years.

SYMPTOMS AND DIAGNOSIS
The most obvious symptoms of CHF are shortness of breath (the medical term for this is dyspnea) and swelling of the feet and ankles (edema). Sometimes, the shortness of breath is only noticeable when performing an activity, such as climbing stairs (dyspnea on exertion), but it can get to the point where the patient is short of breath at rest and can even progress to the patient becoming short of breath when lying down. Other symptoms include chronic cough, fatigue, and the sensation of a racing or irregular heart beat (palpitations).

The simplest and best way to track heart failure is by monitoring the patient for weight gain over a short time period. This usually indicates that the patient is retaining fluid, and the congestion is becoming worse and needs further treatment.

Heart failure can also be detected on examination. Patients will have swollen feet and ankles, but they also have signs of fluid buildup in the lungs, which is determined by listening to the chest and hearing crackles (rales). Listening to the heart can also pick up more subtle abnormal sounds associated with CHF.

There are many tests that can detect signs of heart failure, but the best is an echocardiogram. This test uses sound waves to observe the heart function and the valves and can detect a heart that is pumping poorly or has leaking heart valves.

CHF can be caused by damage to the heart from heart attacks, heart valve problems, infections, birth defects that result in poor heart function over time, and even abnormal heart rhythms. Discovering which of these or other factors may have caused heart failure often requires additional tests.
TREATMENT
There are a number of treatment options for CHF. The most appropriate approach is based on the severity of symptoms, the causes, and the condition of the patient’s other organs.

All patients, regardless of other treatments, will need medications to help treat this disease. The staple treatment options for CHF include a combination of drugs: angiotensin-converting enzyme inhibitors, β-blockers, digoxin, and diuretics (“water pills”). The combination of drugs will vary based on the patient’s tolerance to the medications and the function of other organs, especially the kidneys, as well as blood pressure.

Sometimes, pacing the heart can help improve both symptoms and function. This treatment is known as cardiac resynchronization therapy. Some patients with CHF are prone to life-threatening abnormal heart rhythms; in these patients, an implantable cardiac defibrillator can be placed to shock the patient back into a normal rhythm if necessary.

If CHF is caused by a fixable problem and the heart damage is not severe, the condition may be repaired. The potential for such repair is why early reporting of symptoms and diagnosis are important. For example, if CHF is caused by blockages to the arteries that bring blood to the heart (coronary artery disease), it may be possible to bypass or stent these arteries to increase circulation and improve the function of the heart. Repair is only possible, however, if the heart is not damaged beyond repair and if other organs are still functioning adequately.

If the heart is damaged beyond repair, then replacing the heart with a heart transplant is an option. Unfortunately, this is not a procedure available to everyone. Often, other organs have been damaged to the point that a heart transplant would be too dangerous. Sadly, many people die waiting for a heart transplant because there are not enough organs available to meet the need.

VENTRICULAR ASSIST DEVICES
Ventricular assist devices (VADs) are mechanical pumps that aid the heart in pumping blood to the body. Blood is moved to the lungs by the right side of the heart (specifically, the right ventricle); then, oxygenated blood leaving the lungs is pumped to the rest of the body by the left side of the heart (left ventricle). The assist device can be used to aid whichever side of the heart is failing—often the left.

These devices are fully implanted inside the patient and have a narrow “driveline” (a wire the thickness of a No. 2 pencil), that comes out through the skin and connects to both the power source and a small computer that controls and monitors the device. There are two batteries—each lasts for at least 8 hours, and the patient merely switches one battery at a time when the battery power drops to 50%.

VADs are extremely durable, and there is even a patient who has been living with one for 7 years. The hospital stay required for implantation is a few weeks, and then the patient returns home and can resume a very functional life, with the exception of participating in full-contact sports. Many patients return to work, and the need for rehospitalization is less frequent than for patients with CHF who are treated medically.

(ARTICLE CONTINUES ON NEXT PAGE)
MULTIPLE ROLES FOR VADS

Some patients may be candidates for heart transplantation or may even be on a transplant list, but their condition suddenly worsens before a heart is available. These patients can benefit from a VAD as a “bridge to transplant.” The device ensures adequate circulation so that the patient is in better condition at the time of transplant than if medication alone were used to stabilize the patient until a heart became available. Fortunately, the technology and our familiarity with these devices has progressed to the point where the chances of survival are the same whether one undergoes a heart transplant or is fitted with a VAD first and then later receives a new heart.

A VAD may also be a good final solution for patients who are not candidates for a heart transplant. These patients have a better quality of life, longer survival, and fewer hospitalizations than patients treated with medication alone. Patients have lived as long as 7 years with these devices and have resumed near normal lives, many returning to work or other activities that they enjoy. For these patients, it is a relief not to feel short of breath and constantly tired.

In some cases, a patient’s heart just needs time to recover from an acute event, such as an infection or heart attack. In these patients, the VAD can be placed as a “bridge to recovery.” The device is implanted to provide improved blood flow to all the organs in the body until the heart recovers, which may be as long as 6 months. When the heart is showing signs of recovery, the device can be removed. This approach has been used successfully in many patients with return of normal heart function at the time of device removal.

Probably the most significant role that the VAD can play is to allow us to provide a backup for patients whose hearts might be fixable. These are patients whose heart function is so compromised that they might not survive a procedure to fix the problem, such as replacing a defective valve, performing bypass surgery, or placing a stent. In these patients, we can more confidently try surgery knowing that we have a backup plan. Simply put, if the procedure is unsuccessful, we can place a VAD to support the patient until transplant or recovery, or even leave it in place as a destination device.

A RANGE OF SUPPORT

VADs have broadened the treatment options we can offer patients with CHF. These devices allow us to repair hearts with a level of safety in the form of a backup, by supporting the patient until a transplant is available, by buying time until the patient’s heart recovers, or even as an alternative to heart transplantation. It’s clear that VADs can improve quality of life and survival time, and they can also reduce the frequency and time spent in the hospital.

Ask Your Doctor

1. I have CHF, is the damage repairable?
2. I have CHF, what should I expect for follow-up care?
3. What are my limitations if I have a VAD implanted?
As a physician and cardiac surgeon, writing about how to avoid an operation might seem opposed to my profession. Unfortunately, we are far from putting heart surgeons out of business, but reaching any goal begins with the first step.

MAJOR RISK FACTORS
An important part of reducing your odds of developing coronary artery disease (CAD) and, therefore, the likelihood of surgery, is to know your risks and how to minimize them.

The problem of smoking, which includes exposure to second-hand smoke, cannot be overemphasized. The adverse health effects of tobacco use including snuff, smokeless tobacco products, and traditionally noninhaled sources such as pipes and cigars, are too numerous to cover in the scope of this article. It should suffice to say that, for overall health, cessation of tobacco use might well be the most important step one can take for preventing disease and general health maintenance.

Hypertension or high blood pressure is known as the silent killer; in itself, it rarely causes symptoms, but its effect on the cardiovascular system can have lethal consequences. Sadly, high blood pressure is ubiquitous. Up to 90% of Americans will develop it in their lifetime, and these numbers are higher in African Americans and women more than 65 years old.

Increased cholesterol is another risk factor for CAD. We know more about cholesterol and its effects than before. Total values are important (less than 200 is your goal). The types of cholesterol—“good” or high-density lipoprotein (ideally greater than 50) versus “bad” or low-density lipoprotein (less than 100), as well as triglycerides (ideally less than 150)—also have a significant effect on the development of CAD.

Other factors are also important to consider. Family history is useful in understanding the genetic risk for developing CAD. Diabetes mellitus is a significant risk factor for the development of many disease processes, especially CAD. Obesity, especially truncal obesity (around the waist), is another issue that poses a threat to heart health.

REDUCING RISK
Now that we have outlined the major risk factors, how can we minimize their effects? There is no easy, one-step solution. Remember, though, that every little bit helps, and each step can result in a longer life journey.

Stopping tobacco use is difficult at best and can often take multiple attempts. Don’t be discouraged. There are drugs such as Chantix (varenicline, Pfizer, Mission, KS) and weaning tools such as Nicoderm patches and Nicorette gum (GlaxoSmithKline, London, UK). There are also many sources of counseling and support through the American Heart Association, church groups, hospitals, and other organizations. Remember that weaning tools still have the negative effects of nicotine on blood vessels and are not totally free of CAD risk.

(LEARN MORE)

The American Heart Association website is an excellent resource for additional information about developing and maintaining a healthy lifestyle to prevent coronary artery disease: http://www.heart.org/
(CONTINUED FROM PREVIOUS PAGE)

High blood pressure management is the common thread running through much of CAD risk management. Exercise and weight control are important components of any program for blood pressure control. First, high blood pressure has to be recognized through blood pressure measurement at screening fairs, drugstores, at home, or as part of a routine physical exam. Thirty minutes of exercise a day, five times a week at least can help control blood pressure as well as weight. Start young to make exercise a habit for life, and remember that every bit helps—start slowly and work your way up. Diet is also a mainstay of blood pressure control with special emphasis on sodium intake. Nutrition awareness is a big help here. Processed foods, soups, snack foods, and diet salad dressings are all very high in sodium and need to be avoided or used in limited amounts. Salt is one of man’s earliest preservatives and is an acquired taste, but other spices can substitute.

Stress management is sometimes a more elusive lifestyle problem than any other. There are many techniques available to help in this area, including meditation. The American Heart Association website provides more examples and ways to utilize these techniques.

Cholesterol levels can be affected by diet and exercise but are largely determined by genetics and can also be addressed by medications. Knowing your levels is important to decide what can and should be done. Discuss your cholesterol levels with your primary care physician.

When it comes to diabetes, again diet and exercise, as well as weight, play an important role. If you have diabetes, you must practice careful blood sugar control. Cut back on refined sugars in your diet, and work closely with your primary care provider.

At present, genetics are not alterable. We need to be aware, however, of family histories to help ascertain an individual’s level of risk. This information can alter the extent and type of screening recommended.

Not surprisingly, obesity interacts with many of the areas already discussed here. The ideal weight varies from person to person, but good starting points are a body mass index of less than 25 and a waist measurement less than 40” for men and less than 35” for women. Maintaining your weight within these limits decreases the risk for CAD. Weight control ultimately boils down to balancing the number of calories ingested against the number of calories used, so that 30 minutes a day of aerobic exercise is crucial. The source of calories is also important.

EARLY DETECTION

If you are diagnosed with CAD, early detection can decrease the risk of treatments and improve the length and quality of your life. Be aware that some symptoms may be atypical. You need to know that CAD is not signaled by simple chest pain. Neck and jaw discomfort, chest tightness, shoulder and arm discomfort, indigestion, and shortness of breath all can be symptoms of CAD. A significant number of patients will have myocardial infarction (heart attack) or sudden death as their first symptom, so staying vigilant about reducing risk factors and having regular checkups with your primary care physician are important.

Ask Your Doctor

1. What are my cholesterol and triglyceride levels?
2. Do I have any risk factors for coronary artery disease?
3. Can I safely begin an exercise program?
A PATIENT’S STORY: Eugene

Eugene is only the third person to undergo the transcatheter aortic valve implantation (TAVI) procedure at Albany Medical Center Hospital, and he is one of a very few to have this procedure done in the United States.

TAVI is a very new minimally invasive procedure that was FDA approved in November 2011 for high-risk patients who need cardiac aortic valve repair but are not candidates for traditional open heart surgery. The procedure is only being performed at a handful of hospitals, and Albany Medical Center is one of the first. The TAVI team is led by a group of skilled cardiac and vascular specialists including Drs. Augustin DeLago, Edward V. Bennett, Manish Mehta, Lewis Britton, and Saroj Pani.

When I went to visit Eugene, I had no idea what to expect. I knew that Eugene was an 85-year-old man with a history of open heart surgery, cardiac stents, a pacemaker and a defibrillator, iliac stents, abdominal and thoracic aneurysms, and a hip replacement—who less than 24 hours ago had undergone the TAVI procedure. I couldn’t help but think that I was going to meet a very sick man today.

DAY 1 OF RECUPERATION

I rang the buzzer to be let into the cardiac intensive care unit (CICU) and asked to see Eugene. Through the intercom, I was told, “Sure, why not. He is like a rock star today. Everyone has been in to see him.” As I walked in, I stopped at the desk to confirm where I could find Eugene. Before I could ask, however, the man in bed 226 said, “I believe you are looking for me.”

I turned and walked toward the speaker, a bit surprised at what I saw. There in the bed was a bright-eyed man with a huge, friendly smile. He was alert and very much oriented as he reached out and shook my hand. There were a few intravenous tubes in his neck region and a nasal canula giving him oxygen, but Eugene certainly did not appear in distress or weak or as if he had just had a cardiac procedure, as most CICU patients do. I asked him twice for his name and date of birth just to be sure I was with the right person!

(ARTICLE CONTINUES ON NEXT PAGE)
A FAMILY HISTORY
Eugene is a widower and father of two: Brian, age 59 and Marcie, age 56. He received his master’s degree in secondary school administration from St. Lawrence University in New York and, in 1952, began working as a high school coach and athletic director.

His career spanned 44 years and included coaching football, hockey, and track. In the summers, Eugene taught driver’s education. His work kept him active for all those years, making good health and fitness a large part of his daily life, and they still are today.

Eugene doesn’t smoke or drink and says he never has. He tries to eat well and goes to the YMCA three times a week for weight training. As the youngest of 10 children, he is the last surviving member of his family. He believes that all of his siblings had heart disease, but he wasn’t sure if they had aneurysms, “because no one really talked about aneurysms back then.”

RISK FACTORS
Despite being slim and active, Eugene does have a few risk factors for cardiac and vascular disease. He has hypertension (high blood pressure) and hypercholesterolemia (high cholesterol levels). He recalls having a stress test at his doctor’s office a few years ago. While on the treadmill, he remembers having slight shortness of breath. But something showed up on the heart monitor, and the office staff scrambled and called 911. Eugene was immediately sent to the hospital and underwent open heart surgery. The hospitalization and recuperation process was long and arduous, but he feels that his recovery was probably quicker than others’ because he had still been a very active man.

NEW SYMPTOMS
Recently, Eugene started to experience leg swelling and shortness of breath with minimal activity; these symptoms were disabling and limited his daily life. “I have been active all of my life and want to continue being active as long as I can. I was told that the aortic valve in my heart had severely narrowed and needed to be repaired, but they couldn’t open me up again to fix it,” he said. “Luckily, the doctors suggested a new procedure, the TAVI. I was willing to try it so I could continue to have a good, active quality of life.”

When describing his experience with the TAVI procedure on day 1 of his recuperation, Eugene said that all he had to show for it are the two incisions in his groin region. The most uncomfortable part was having the intravenous tubes taped to his neck. With a twinkle in his eye and his nurse in hearing distance, he laughingly said, “The only pain I have is when they pull the tape off my skin!” His nurse looked over and gave him a big smile.

It was now time to end the interview for today. Eugene was beginning to tire and needed his energy because the nurses were going to get him out of bed to walk in a few hours. He was very optimistic about walking today.

DAY 3 OF RECUPERATION
On Monday morning, I stopped by to check on Eugene. It had been a positive couple of days, he said. After walking with his walker in the CICU, he was ready to be transferred to the cardiac floor in the hospital for a day or two before being discharged to his home. Eugene said that his groin incisions were tender now that he was up and moving and that he needed some pain medication. His biggest complaint at this time was being exhausted from not sleeping well in the hospital, and he said he couldn’t wait to get home to his own bed. After discharge, Eugene’s son was going to stay with him while he continued his recuperation.

It is obvious that the minimally invasive nature of the TAVI procedure allows patients a faster recovery than open surgery. This is a new procedure, and surgeons at the Albany Medical Center are rightfully being cautious in monitoring patients for several days afterwards. It is likely, however, that in the future, most patients who undergo TAVI may be able to go home and get back to their lives in just a day or two.

Eugene said, “I recommend this procedure because it is an opportunity to be kept around longer with a decent quality of life. My goal is to make it to 90!” When I asked him, “Why not 100?” a smiling Eugene said, “I just want to be realistic!”

-by Sharon Cillis, RN
In 1948, Albert Einstein was diagnosed with a grapefruit-sized abdominal aortic aneurysm.

At that time, the development of surgical repair of aortic aneurysms with a prosthetic graft was a decade away. The only available treatment was attempting to reinforce the aortic aneurysm wall with cellophane, which would only delay the inevitable aneurysm rupture.

Einstein’s aortic aneurysm wrap reinforcement lasted several years; in 1955, it finally ruptured, resulting in his death. Unfortunately for Einstein, the use of Dacron prosthetic grafts for aortic aneurysms did not happen until later in the 1950s. The few years’ delay in this innovation is likely what cost him his life.

The aorta is the main blood vessel that carries blood from the heart to the rest of the body and is similar in size to a large garden hose. It wraps around the heart and travels down through the chest (where it is known as the thoracic aorta) into the lower abdomen (where it becomes the abdominal aorta). Along the way, the aorta gives rise to blood vessels that supply circulation to all parts of the body. An aneurysm is a progressive weakening and ballooning of a section of the blood vessel wall, a condition that commonly affects the abdominal and thoracic aorta. If undiagnosed and untreated, an aneurysm can rupture, resulting in catastrophic internal bleeding and death.

**THE GOLD STANDARD**

Further innovations in the remainder of the 20th century would lead to improvements in not just the prosthetics used for repairing aortic aneurysms but also in our ability to better manage aneurysm patients in the postoperative period resulting in improved survival. In the 1980s, this evolution led to collaboration between vascular surgeons and interventional radiologists that took us to the next frontier: minimally invasive endovascular aortic aneurysm repair.

Today, endovascular repair has become the gold standard for treatment of infrarenal abdominal aortic aneurysms; these are aneurysms that do not involve visceral arteries that supply vital...
abdominal organs such as the liver, bowels, and kidneys. The procedure involves the delivery and installation of a small device called a stent graft, which is composed of synthetic fabric supported by a metal mesh framework. The device is advanced through a catheter into the aortic aneurysm via the femoral arteries in the groin. Stent grafts are configured similarly to a pair of trousers in that they have a “waist” area at the top and two leg-like sleeves. The waist area is anchored to the healthy aorta between the visceral arteries and the aneurysm, and the sleeves are anchored to the iliac arteries below the aneurysm. Blood flow is diverted through the stent graft, relieving pressure on the aneurysm wall and eliminating its risk of rupture.

Techniques pioneered by the Vascular Group at Albany Medical Center in Albany, NY, have further allowed us to expand the use of endovascular technology in treating ruptured aortic aneurysms emergently, which has had a significant impact in improving patient survival.

2012 AND BEYOND
So where will innovation in aortic aneurysm treatment take us in 2012 and beyond? Well, the next generation of stent grafts will certainly be far more advanced. Such devices will allow surgeons to treat complex aneurysms that are extensive and involve blood flow to the liver, kidneys, and bowels. These stent grafts will include fenestrations and branches to allow preservation of blood flow to the vital internal organs, and will be able to address complex aneurysms that currently cannot be treated by minimally invasive endovascular procedures.

Fenestrations and branches are openings in the stent graft fabric that are tailored to match the patient’s arterial anatomy. During the endovascular procedure, the fenestrations are aligned precisely with the origins of the arteries that extend from the aorta to provide blood flow to vital organs in the abdomen. Special stents designed to keep these arteries open are then navigated through the stent grafts and used to anchor the stent graft fabric to the origins of these vital arteries. The sequence of these maneuvers requires precision within millimeters, and the surgeons navigate these devices with enhanced three-dimensional imaging in the operating room. In the not too distant future, further enhancements in imaging and robotics technology are sure to play a major role in perfecting these procedures even further.

The Vascular Group is one of the few specialized centers in the United States that is currently involved in evaluating the use of fenestrated stent grafts for managing patients with complex aortic aneurysms. In time, these devices will likely gain Food and Drug Administration approval. When they do, we will yet again broaden our abilities in managing patients with increasing complexities of aortic aneurysms by minimally invasive means.

Ask Your Doctor

1. I am over the age of 65 years, how can I be treated for aortic aneurysms?
2. What are the benefits of minimally invasive endovascular aneurysm repair compared to conventional surgery?
3. If I do have an aneurysm, what kind of lifelong surveillance will I need?
THE NEXT FRONTIER:
Biodegradable Stents and Drug Elution

Lower extremity peripheral arterial disease (PAD) affects 3% to 6% of the general population, but the prevalence markedly rises in subsets of the population with advanced age, diabetes, and smoking history.

Although the majority of patients with lower extremity PAD are asymptomatic, the presence of PAD is a strong marker for future adverse cardiovascular events. The earliest and most common presenting symptom in patients with lower extremity PAD is intermittent claudication, pain occurring in the leg muscles when walking that resolves with rest. The superficial femoral artery in the thigh is the most common location of arterial blockage leading to intermittent claudication.

Minimally invasive treatment options with percutaneous catheter-based therapies have made significant advances in the past 2 decades. Despite these advances, long lesions (encompassing more than one-third the length of the vessel) have had disappointing mid- to long-term results. The chance of an angioplasty, stent, or atherectomy procedure keeping the superficial femoral artery open at 1 year is in the 60% to 80% range, but there is less durability in longer follow-up periods.

**DRUG-ELUTION FOR PAD**
The “Holy Grail” device or procedure for peripheral interventions has yet to be found. Currently, many companies are researching new therapies and devices to identify better solutions. The next advance we are going to see is the coupling of drugs to stents to prevent renarrowing in treated thigh arteries.

Cook Group Incorporated (Maple Grove, MN) recently received United States Food and Drug Administration (FDA) advisory panel approval of the Zilver PTX stent. This product adds a coating of paclitaxel to a currently approved stent to achieve improved outcomes and durability. Paclitaxel is a cancer drug that has been used successfully on stents in heart arteries. Previous studies using sirolimus and everolimus (both cancer drugs shown to work when applied to heart stents) on various self-expanding stents showed no lasting benefit. The FDA is expected to grant final approval for US release of the Zilver PTX stent in April 2012.

**BALLOON DELIVERY**
Binding anti-restenosis drugs to angioplasty balloons is now receiving great interest as a way to achieve delivery to the blood vessel without leaving an implant or stent behind. Three large preliminary trials (Thunder, FemPAC, and Levant I) have been performed in Europe, all using paclitaxel delivery by angioplasty balloons.

(ARTICLE CONTINUES ON NEXT PAGE)
These trials have shown improved outcomes over standard angioplasty at 6 months for superficial femoral artery blockages. The ways of attaching the drug to the balloon and sustained uptake in the artery are different for each company and have been not revealed.

Lutonix (Maple Grove, MN) is sponsoring a US trial (Levant 2) that is currently enrolling patients in a blinded fashion to evaluate the delivery of paclitaxel by angioplasty for thigh artery blockages with longer follow-up. It has been one of the fastest-ever enrolling trials in US history, showing a surge of physician interest in studying this type of novel therapy to improve outcomes. Several other companies are nearing the stage of beginning trials in the United States.

**BIODEGRADABLE STENTS FOR PAD**

Concern about implant failure by fracture or narrowing remains an issue for both the FDA and physicians alike. This problem has fueled interest in and development of bioabsorbable or biodegradable devices. The need for a scaffold system to hold the artery open after suboptimal results with angioplasty has been shown today by improved early outcomes using stents made of nitinol in the superficial femoral artery. The long-term results, however, show catch up of failure of these treatments from scar tissue buildup within the stent.

Vicryl suture, which has been used for decades in surgery, is made from a biodegradable material called polyglactin 910. Biodegradable stents have been made of a similar material, poly-L-lactic acid. The human body is able to break down this stent through normal pathways into lactic acid and eventually water and carbon dioxide. Other formulations have been created with magnesium, repeating salicylate molecules, and absorbable tyrosine-derived polycarbonate polymers.

The interest in improving outcomes by adding drug therapy to biodegradable stents is potentially that Holy Grail we seek. The ABSORB trial in coronary arteries has shown promising outcomes at 12 months in 56 patients treated with a bioresorbable everolimus-eluting stent. The development of such platforms for the peripheral arteries is hopefully on the horizon.

**DIALOGUE IS NEEDED**

I encourage physicians to ask patients about their vascular disease symptoms. Likewise, I urge patients to let their physicians know when they experience tightness or cramping in the legs when walking. Many patients attribute these symptoms to aging and do not recognize the fact that they are actually signs of a treatable disease process.

If treatment is warranted, patients should ask physicians about their results with currently used technologies. It is also worthwhile to ask whether your physician knows of or may even be participating in clinical trials to study new products and treatments. Taking part in clinical trials benefits both individual patients and society by helping gain approval of novel therapies. 

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**Ask Your Doctor**

1. **What are the risk factors/symptoms of PAD?**
2. **If I do not have symptoms, do I need to be evaluated for PAD?**
3. **What resources are available to help me learn about PAD?**
When we think of healthy legs, the first thing that comes to mind is exercise, such as jogging or doing squats. Although exercise is important, as we age, maintaining healthy legs requires understanding that goes well beyond just exercising.

Unfortunately, aging affects the arteries, veins, nerves, and bones in our legs, and often presents as peripheral arterial disease (PAD), varicose veins and venous insufficiency, peripheral neuropathy, and osteoarthritis.

The symptoms of many of these conditions overlap and can be difficult to distinguish. Often, patients with PAD who need a vascular specialist end up seeing an orthopedic surgeon and a rheumatologist as well, and patients with osteoarthritis often need to consult with vascular specialists.

UNDERSTAND THE PROBLEM
As much as a healthy diet and exercise are keys to maintaining health, in your later years, knowing about and modifying the underlying risk factors for disease are of the utmost importance. If you or your family members have hypertension (high blood pressure), diabetes, high cholesterol, obesity, or heart disease, or if you smoke, then you have the risk factors for developing PAD. It is estimated that 12 million Americans are affected by PAD, a manifestation of systemic atherosclerosis, also known as “hardening of the arteries.”

This problem can affect any of the arteries supplying blood to the organs and limbs. With the passage of the years, cholesterol, fat, and calcium build up on the artery walls, forming plaques that can rupture and block blood flow. When a blockage occurs in the coronary arteries, it can lead to a heart attack, a blockage in the carotid arteries supplying the brain can cause a stroke, and a blockage in the arteries to the extremities can lead to leg cramps, sores, gangrene, and even amputation.
RECOGNIZING RISK

PAD is difficult to diagnose by symptoms alone; this may be why only 25% of patients with PAD are recognized and undergo treatment. A recent study called PAD Awareness, Risk, and Treatment: New Resources for Survival was conducted across 25 US cities and 350 primary care practices, evaluating nearly 7,000 patients with PAD. The researchers found that a health history and physical examination missed 85% to 90% of patients with PAD. The study also showed that, to successfully detect PAD, doctors need to perform noninvasive tests, such as measuring the ankle-brachial index (ABI).

We now know that the incidence of PAD increases with age. This condition affects 5% to 10% of patients between 55 and 65 years of age and approximately 20% of patients older than 65. Unfortunately, PAD is often undetected, as many people think their aches and pains are simply related to aging or arthritis. Unlike arthritis, however, if the symptoms are ignored, this serious disease can dramatically reduce life expectancy.

If you have risk factors for PAD, there are simple noninvasive tests that can be performed during a routine doctor’s office visit, such as taking an ankle-brachial index measurement and conducting a pulse volume recording. Based on these initial tests and your symptoms, a treatment strategy can be planned that includes risk factor modification, changes to diet and exercise, medication, and sometimes, vascular procedures.

VARIABLE VEINS

Similar to impaired arterial circulation, reduced venous circulation can lead to skin damage that ranges from mild to serious ulceration. Varicose veins, for example, are abnormally enlarged veins under the skin that affect 25% of the population in the United States. Risk factors include female gender, advancing age, pregnancy, obesity, and a lifestyle or occupation that involves prolonged periods of sitting or standing (putting stress on the venous circulation in the legs). Symptoms of varicose veins include burning, itching, swelling, and throbbing near the engorged veins, particularly at the end of the day.

Sometimes, blood clots within the varicose veins cause inflammation known as phlebitis, which can extend further into the circulation and lead to deep vein thrombosis, requiring emergent treatment. Care options for phlebitis vary depending on the severity of the problem and a patient’s personal preference and include wearing graded compression stockings or undergoing percutaneous venous ablation or sclerotherapy, among other treatments.

STAY A STEP AHEAD

As we age, it’s important to continue eating right and staying active. You can go one step further in maintaining healthy legs by understanding and modifying any risk factors you may have for developing arterial or venous insufficiency. If you do experience symptoms, such as pain in your legs when walking that goes away when you rest, be sure to seek early diagnosis and treatment.

Ask Your Doctor

1. Am I at risk for PAD?
2. How can I modify my risk factors?
3. How will I know if I develop PAD?
Age brings various health problems, from minor to serious, that may require intervention. Many surgical procedures require little recovery time and use small incisions compared to 15 or 20 years ago, when long hospital stays and longer incisions were the norm.

Have you ever wondered how these improvements came about? Any kind of medical innovation starts with an idea, which is studied and analyzed, implemented and practiced, and finally shared with the world.

**HAIL HISTORY**
Transformation of cardiac and vascular surgery throughout history has been an absolute necessity. For example, to find a way to stop hemorrhaging, simply put, someone had to figure out how to tie a blood vessel. It began with one man’s idea.

That idea began with Sushruta, an Indian surgeon who practiced during the 5th century BC. To achieve hemostasis during surgical procedures, he tied bleeding vessels (a procedure we now call *ligation*) by applying pressure and cold compresses. This treatment helped the bleeding edge to shrink and the flow to stop. To effectively suture the vessels, Sushruta used vegetable and animal materials, absorbable and non-absorbable, such as grass and silk threads. This early physician’s ideas set the stage for the future.

For the next 2,000 years, little progress was made in cardiac and vascular surgery. Although ligation and cauterization were the primary methods to treat hemorrhaging, noted limitations remained. In 1759, Hallowell performed the first documented brachial artery repair. He acted upon a suggestion by his colleague, Richard Lambert, to treat an injured brachial artery. Hallowell closed the laceration by using a half-inch steel pin to elevate the edges of the lacerated artery and passed a figure-eight suture around the edges of the wound. This technique controlled the bleeding while maintaining blood flow throughout the brachial artery.

Another 100 years passed before Nikolai Eck, a young surgeon working in the Russian Military Medical Academy, performed the very first vascular anastomosis along two ends of a blood vessel in 1877. Through an experiment using eight dogs, he was able to divert portal blood away from the liver by using the anastomosis technique between the portal vein and the inferior vena cava. Eck’s idea contributed to advancements in future surgical techniques.

(Article continues on next page)
Eck’s work may have remained unknown outside of Russia, however, had it not been for Ivan Pavlov. Using Eck’s procedure in laboratory experiments, Pavlov achieved great innovations. He documented his work and, in 1904, went on to win a Nobel Prize for Physiology or Medicine.

During the same year that Pavlov performed that first anastomosis, 4-year-old Alexis Carrel was growing up in France. At the turn of the century, Carrel went on to perfect the arterial anastomosis and the use of vein grafts in arterial beds. In 1912, his work was recognized when he was awarded the Nobel Prize for Physiology or Medicine. In his later work, Carrel saw the importance of being able to attach blood vessels together and investigated different methods to achieve a successful outcome. He tested different methods on human cadavers and animals and performed experimental surgeries to perfect the method. Carrel’s ideas led to the first routine use of vein bypass in 1948, the first successful renal transplant in 1955, and the first human limb reattachment in 1962.

At the beginning of the 20th century, Carrel had also described cardiac mitral valvulotomy, annuloplasty, and coronary artery bypass. These procedures were the fundamental ground that allowed for the growth of vascular and cardiac procedures as practiced today.

**THE DOMINO EFFECT**

Thanks to advancements in technology, the evolution of innovations has clearly accelerated over the past quarter-century. In the late 1800s, anastomosis evolved from arterial ligation. Angioplasty performed in the 1960s led to the introduction of stents in the 1980s, which led to treatment of aortic aneurysms in the 1990s.

The 21st century continues to introduce new products such as drug-eluting and bioabsorbable stents to improve the patency of blood vessels. Fenestrated and branched stent grafts allow high-risk aortic aneurysms to be treated without undergoing major open surgical repair. Transcatheter aortic valve implantation allows high-risk cardiac patients treatment options not available before. All of these advances can be traced back to an original idea that was ushered through research and development and practice to become the cutting-edge treatments of today.

If you would like more information about the clinical studies that are available for vascular emergencies, visit: www.clinicaltrials.gov
The “V-Healthy, Tell 2 People” campaign focuses on vascular health, education, and awareness.

BOOMERS AT RISK
Today, the aging baby boomers are not only the fastest growing population in the United States, but also the one that harbors the greatest risks for vascular disease. Most commonly, vascular disease presents as peripheral arterial disease (PAD), where blood flow through the arteries is diminished or blocked due to a narrowing called atherosclerosis (also known as “hardening of the arteries”). Although physicians are well aware that PAD is a powerful predictor of disability and death, this knowledge is lacking in most other circles.

KNOW THE FACTS
Having undiagnosed and untreated PAD for just 5 years increases your risk of death more than having colon cancer, breast cancer, or lymphoma. Luckily, there are many simple and practical ways to prevent the progression of PAD.

If you or someone you know is over the age of 60, has diabetes, hypertension, high cholesterol, has ever smoked, or has ever been treated for heart disease, you will benefit from the information provided through the V-Healthy, Tell 2 People awareness campaign.

COMING SOON
The Center for Vascular Awareness, in collaboration with the Northeast Chapter of the Society for Vascular Nursing, will bring the V-Healthy, Tell 2 People program to your community. These educational sessions will include a focused discussion about vascular health issues that affect our daily lives. Vascular healthcare professionals will provide firsthand information on all aspects of vascular health, including risk factor modification, early diagnosis, treatment, prevention, and healthy living.

We believe that education is prevention, and we know that early recognition and treatment of PAD are the keys to survival. So attend a session and spread the message. You could save a life!
“Yeah, I’m doing a little bit of the housework now, the laundry and such,” Dave Morey told me on a recent Saturday. Although most guys might balk at a “honey do” list, this 64-year-old husband delights in it. That’s because he’s just glad to be alive.

In November 2011, Dave was admitted to Albany Medical Center hanging onto life because his heart was failing. As his wife Kathy explained, “Dave was in the hospital. They did a catheterization, and that was when we realized things were not heading in the right direction and that a heart transplant was needed.” Or so they thought. Dave’s cardiologist, Dr. Mark Tallman, had another idea.

Rather than let Dave languish in the hospital and grow even weaker waiting for a donor heart to become available, Dr. Tallman suggested the HeartMate II (Thoratec Corporation, Pleasanton, CA) approved just a year ago. This high-tech device is the latest in cardiac technology.

PUMPING IT UP
The HeartMate II is a left ventricular assist device (L-VAD). It helps the left ventricle, the main pumping chamber of the heart, deliver blood to the rest of the body—a crucial function, to put it mildly. “When I made the recommendation [for the L-VAD],” Dr. Tallman said, “Dave’s heart was so weak, and his congestive heart failure so advanced that you could hear him down the hall, wheezing and gasping for air, just to make the walk into my office.”

L-VADs have been around since the mid-1990s, but they were larger and had more moving parts then, with more chance for trouble. “The big advantage of the HeartMate II,” said Dr. Tallman, “is that it only has one working part, which is the impeller. That’s the part that spins internally and creates the suction to pull blood from the diseased left ventricle and move it into the aorta.”
POWERING ON

Dr. Tallman refers to the implantable parts of the HeartMate II as the “plumbing.” The rest of the hardware, including the controller for the device, is worn outside the body, as are the batteries.

“I don’t even realize I have it on,” Dave told me. He plugs into the base unit to sleep and switches to battery power when he wakes up. The last thing you want is to lose power, which is why Dave wears two batteries when he’s out and about. The batteries last about 7 hours and can be worn on his chest in a vest or on his hips in a sling. Dave says wearing them on his hips allows him to tuck in his shirt and be more normally presentable when he and his wife go to the market or out to lunch.

Leaving the house is a big deal because after the surgery, Dave suffered almost every setback imaginable. Both his kidneys and liver failed. He was sedated for much of 5 weeks until his medical team returned his system to working order. The only residual problem he has is lingering thyroid dysfunction, and he anticipates undergoing surgery to remove that gland. Other than that, Dave says he’s feeling better and stronger by the day since returning to his Guilderland home in January.

AN L-VAD FOR LIFE

Because the HeartMate II L-VAD lasts for years, it can be called a destination device, one you wear forever, rather than using temporarily as a bridge to transplant. Older assist devices wore out in 18 months.

“About 85% to 90% of patients who have undergone heart transplant are alive at 1 year,” explained Dr. Tallman. “The survival rate to 1 year after having an L-VAD implant is very similar; 90% of people with an L-VAD are alive at 1 year.”

Those numbers are something for Dave to consider. Right now he’s thinking he will opt for a heart transplant down the road. But he knows that will mean taking even more medication than he’s currently prescribed, and he understands that the antirejection drugs that go hand in hand with an organ transplant can take their toll. But Dave also thinks that he might have more freedom with a transplant. Despite the smaller size of the wearable L-VAD technology, he’s still tied to the battery life of the unit, and that is something he’s still learning to live with.

As for L-VADs in general, Dr. Tallman believes there will come a time when the units are smaller, even more user friendly, and may even supplant heart transplants altogether. For the time being, however, Dave Morey is just happy to be alive and wants others to know they can survive the implant surgery, even the complications, and that every day is better. Oh, and, he also says doing the laundry is A-OK. 🧼
The Vascular Group was founded to establish a comprehensive vascular care center consisting of board-certified vascular specialists trained in endovascular, angiographic, and surgical techniques. Our physicians distinctively combine expertise in both traditional open surgery and cutting-edge, minimally invasive catheterization techniques to manage peripheral vascular disease. We are committed to promoting vascular health and delivering the highest-quality care to our patients and our community.

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