The Multicenter Automatic Defibrillator Implantation Trial (MADIT) research group at the University of Rochester continues to deliver high impact studies on the use of implantable cardioverter defibrillators, revolutionizing the field of cardiology, setting new international guidelines, and saving countless lives.

The MADIT team recently showed that a simple change in programming defibrillators dramatically decreased inappropriate shocks – by as much as 80 percent. The study, the latest in two decades of research, was spearheaded by Arthur J. Moss, M.D., a world-renowned expert in the treatment and prevention of cardiac arrhythmias and sudden cardiac death.

To the team’s surprise, the new programming also increased survival, lowering the risk of death by 55 percent compared to patients whose devices used traditional programming. This reduction is above and beyond the usual decrease in mortality associated with defibrillator therapy, leading to an overall 70 percent reduction in death.

“When the findings were first uncovered there was a sincere, general enthusiasm that we had finally come to improve the therapy we’ve been using for 20 years, and that we’ve made true progress in making ICD therapy safer, more effective, and more acceptable to patients,” Moss said.

The MADIT-RIT (Reduce Inappropriate Therapy) study results, published in the New England Journal of Medicine Nov. 6, show that simply raising the heart rate at which the device is set to deliver therapy made all the difference.

“The way we’ve been using implantable defibrillators for the last 20 years has really been less than optimal,” said Moss, professor of Cardiology. “The extent to which the new programming reduced death and inappropriate therapies was quite striking and has the potential to beneficially affect a wide

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Heart failure affects six million people in the United States and contributes to 300,000 deaths annually. With as many as 670,000 new cases diagnosed each year, and an ever-growing elderly population, this disease touches approximately 10 in 1,000 people. Although there are highly effective medications available — angiotensin converting enzyme inhibitors, angiotensin receptor blockers, beta blockers, and aldosterone inhibitors — they don’t stop the progression of disease for many patients.

Treatment for advanced heart failure involves a heart transplant or a ventricular assist device. However, heart transplantation is a limited option due to low numbers of donors, with only about 2,200 heart transplants performed each year in the U.S.

The introduction of left ventricular assist devices (LVADs) a decade ago provided a viable option for advanced HF patients. URMC was among the first centers in the country to begin studying the use of the LVAD in 2004. These studies showed that LVADs extend survival when used as destination therapy or bridge to transplant.

The first major randomized trial, the REMATCH study (Randomized Evaluation of Mechanical Assistance for the Treatment of Congestive Heart Failure), compared LVAD (HeartMate XVE) to standard therapy. Survival at one- and two-year intervals was twice and three times as likely for people with LVADs over traditional therapy.

Since then, the HeartMate II was introduced, and this smaller, lighter axial flow pump has proven more effective in both destination therapy and bridge to transplant. Results showed improved survival, 80 percent at one year, which is comparable to the 87 percent survival for transplant patients at one year. Patients with the HeartMate II also experienced improved quality of life and exercise capacity.

URMC’s Program in Heart Failure, Artificial Heart and Transplantation offers comprehensive care by the largest team in Upstate New York. The program is certified by the Joint Commission for Advanced Heart Failure and Ventricular Assist Devices. To refer patients with advanced heart failure for consideration of a ventricular assist device, please call: (585) 275-2877.
MADIT Research Changes Care, Saves Lives

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spectrum of patients who are at risk for sudden death or rhythm disorders.”

This is the latest in the large body of MADIT research that shows that ICDs are extremely effective in preventing death in patients at risk of irregular heart rhythms and sudden cardiac death, including individuals who’ve suffered a heart attack. In 2002, the MADIT II study changed medical guidelines nationwide, making thousands of heart attack survivors eligible for ICD therapy. Currently, around 200,000 ICDs are implanted in the U.S. every year.

But, according to a 2008 study in the Journal of the American College of Cardiology, approximately 20 to 25 percent of defibrillator therapy is inappropriate. Such therapies are not only painful, but can take an emotional toll as well. Data from a 2002 trial comparing anti-arrhythmic drugs and defibrillators suggested that shocks are associated with reduced mental well-being. And a recent review of more than 45 studies found that such emotional distress is not uncommon, reporting that between 11 and 28 percent of ICD patients had some form of depression and between 11 and 26 percent had an anxiety disorder.

MADIT-RIT is the first large-scale, randomized study designed to evaluate specific programming features to reduce inappropriate therapy. The team enrolled 1,500 patients in the United States, Canada, Europe, Israel, and Japan. All patients had heart disease and received a Boston Scientific ICD or CRT-D.

Currently, most defibrillators are set to initiate therapy when the heart rate exceeds around 170 beats per minute, but rates of 180 or 190 are not always dangerous, are usually short-lived, and could be related to increased activity or exercise. Unfortunately, Moss said, defibrillators aren’t very good at differentiating benign from malignant rhythms in this “in-between” range.

Setting the device to fire at a higher rate of 200 beats per minute reduced the risk of experiencing a first inappropriate therapy by 79 percent compared to standard programming. Fewer shocks also corresponded with less energy delivered to the heart, which study authors believe contributed to the reduced risk of death.

“There is considerable research to suggest that there is a small amount of damage to the heart muscle with each delivered shock,” added Moss. “If we can eliminate the unnecessary shocks, this is going to be associated with less heart damage and improved outcomes.”

The trial’s sponsor, Boston Scientific, was not involved in data collection or data analysis. Moss, who has led the MADIT trials since their inception in the 1990s, holds no stock in any device company, has never been a member of any corporate speaker bureau, and since Dec. 1, 2008, has chosen not to accept honoraria from Boston Scientific for any professional activity.

The last major study, MADIT-CRT (Cardiac Resynchronization Therapy), showed resynchronization therapy plus defibrillator (CRT-D) prevented the progression of heart failure in patients with New York Heart Association Class I or II symptoms and left bundle branch block (LBBB). Originally approved to treat patients with severe heart failure, this study led the FDA in 2010 to extend approval of the device to patients with milder forms of the disease.

Today, many patients are reaping the benefits of device therapy; of the more than 5.5 million heart failure patients in the U.S., roughly 70 percent have class I or II symptoms and may be eligible for CRT-D therapy.

URMC’s data from the MADIT trials has contributed to the publication of more than 250 scientific studies over the past two decades. Examples include locating the most beneficial lead implant positions for CRT, recognizing the most appropriate ECG pattern for CRT and achieving the most optimal pacemaker programming parameters for CRT.

URMC electrophysiologists participated in many of the MADIT trials. Our cardiology team is also teaching others about the implantation of ICD and CRT devices in national settings and training courses. To refer a patient for an electrophysiology consultation or procedure, please call: (585) 275-2877.

Heart and Vascular Center Leaders

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Fenestrated Endografts Change Aortic Aneurysms Care

Customized fenestrated and modular branched stent-grafts are the latest advance in the evolution of endovascular aortic aneurysm repair. About 30 percent of patients have anatomic contraindications which limit the use of FDA-approved aortic endografts.

Now there are additional treatment options for the management of complex aortic aneurysms. A new fenestrated aortic endograft device was recently introduced for aneurysms in which the infrarenal aortic neck is too short to place a conventional endograft. These stent grafts can be customized with small or large fenestrations, and scallops.

Most of the published data on fenestrated and modular branched stent grafts is from experiences outside of the United States. European researchers published the mid-term findings after implantation of 38 branched and fenestrated endografts in patients with unfavorable anatomy for a traditional endovascular aneurysm repair and who had aneurysms larger than 5.5 cm. In this cohort, 30 patients had short necks and 8 patients had either thoracoabdominal or suprarenal aneurysms.

They evaluated morbidity and mortality, renal function, endoleak, patency and aneurysm sac size at discharge, one month, six months, 12 months and annually thereafter and found 37 of 38 patients had successful sealing on completion angiography. Twenty percent of patients had endoleaks and 30-day mortality was 2.6 percent. Long-term evaluation showed cumulative branch patency was 92 percent at 46 months and three vessels, or 4 percent, were lost post-operatively.

URMC is one of only 30 institutions in the United States, and the only site in the Finger Lakes region, to offer fenestrated endovascular aortic stent grafts. The team treats approximately 150 aortic aneurysms per year and approximately 30 percent are not candidates for EVAR.

URMC’s Heart and Vascular Center includes a robust team of vascular surgeons, mid-level providers, operating room staff and anesthesiologists who are available around-the-clock to take referrals at (585) 275-2877.