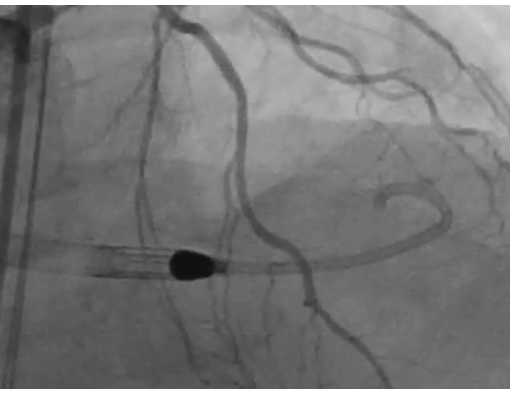
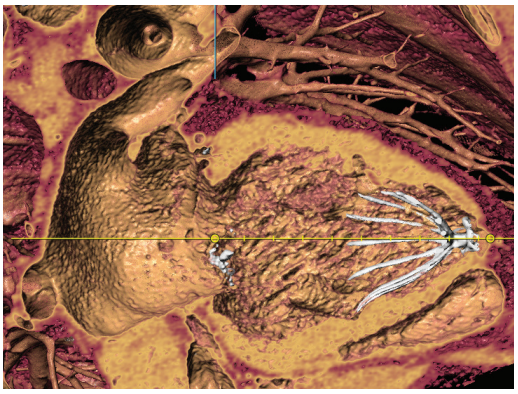
University Hospitals
Harrington Heart & Vascular Institute
Cleveland | Ohio

SCHOOL OF MEDICINE
CASE WESTERN RESERVE UNIVERSITY

HARRINGTON HEART & VASCULAR INSTITUTE INNOVATIONS





Winter 2017

CONTROVERSIES IN CARDIOLOGY

PCI or Bypass Surgery for Left Main Coronary Artery Disease

Daniel Simon, MD: It is my privilege to welcome Dr. Joseph Sabik to our Controversies in Cardiology series. Joe is one of the nation's leading heart surgeons and has joined University Hospitals as the Chairman of the Department of Surgery. He was most recently Chairman of Thoracic and Cardiovascular Surgery at the Cleveland Clinic and has performed more than 8,000 heart operations. His areas of clinical expertise include multi-arterial coronary artery bypass grafting, minimally invasive heart surgery, and heart valve repair and replacement surgery. Joe is clearly an expert for our topic today: PCI or bypass surgery for left main coronary artery disease.

Joseph Sabik, MD: Thank you, Dan. I am really excited to be joining UH and the Harrington Heart & Vascular Institute. I also enjoy squaring off with an interventional cardiologist on the topic of optimal revascularization strategies for coronary artery disease.

Dr. Simon: So let's set the stage for our readers and listeners. Patients with obstructive left main coronary artery disease are usually treated with CABG. Randomized trials such as SYNTAX have suggested that drug-eluting stents may be an acceptable alternative to CABG in selected patients with left main coronary artery disease. We just returned from the TCT in Washington, DC, and heard the results of the landmark EXCEL trial that was also published in the New England Journal of Medicine. You are one of the Co-PIs of this trial. Congratulations. Tell me about the design of the trial.

Dr. Sabik: EXCEL is a large, multinational, multicenter trial that randomized 1,905 patients with left main coronary artery disease of low or intermediate anatomic complexity to undergo either PCI with a Xience everolimus-eluting stent or CABG. Anatomic complexity was assessed at the site and included patients with a SYNTAX score of 32 or lower. The primary endpoint was the rate of the composite endpoint of all cause death, stroke or MI at three years, and the trial was powered for noninferiority testing of the primary endpoint. Secondary endpoints included the same composite at 30 days as well as the addition of ischemia-driven revascularization at three years. Importantly, patients had to be suitable for revascularization by either strategy of revascularization by a heart team that included both a heart surgeon and interventional cardiologist. The goal of PCI or CABG was to achieve complete anatomic revascularization.

Dr. Simon: It is important to add that the trial tested contemporary PCI and surgical techniques. The Xience stent has a very low rate of stent thrombosis and restenosis. Tell me about surgical recommendations.

Dr. Sabik: We encouraged the use of arterial bypass grafts, intra-operative epi-aortic as well as trans-esophageal echocardiography. On- or off-pump CABG was performed at surgeon's discretion. On average, 2.6 grafts per patient were placed and an internal thoracic artery graft was used in nearly 99 percent of the patients. Bilateral ITA grafts were used in nearly 29 percent of patients and radial artery grafts in 6 percent. All arterial grating was performed in 25 percent. In the PCI arm, 2.4 stents with an average total stent length of 49 mm were implanted per patient.

Dr. Simon: As an interventional cardiologist who performs unprotected left main procedures, it is also worth mentioning that distal left main bifurcation or trifurcation disease was present in 80 percent of the patients, and two-vessel or three-vessel disease was present in 51 percent of the patients. So, what are the top-line results?

Dr. Sabik: The incidence of the primary endpoint of death, stroke or MI at three years occurred in 15.4 percent of patients in the PCI group and in 14.7 percent of patients in the CABG group with a hazard ratio of 1.0. This enables us to conclude that PCI was noninferior to CABG with respect to the primary endpoint. The secondary endpoint of death, stroke, MI and ischemia-driven revascularization occurred in 23.1 percent of patients

in the PCI group and in 19.1 percent of patients in the CABG group, achieving noninferiority but not reaching statistical significance for superiority.

Dr. Simon: In general, the purpose of a noninferiority trial design is to determine whether a new device, drug or treatment strategy that might offer safety or quality of life advantages is still efficacious. In other words, is there a trade-off that one is willing to accept? In EXCEL, this trade-off was set as a noninferiority margin of 4.2 percent. Therefore, it is worth looking at the early 30-day time point and landmark analysis to gain insight into the possible advantages of one strategy versus another.

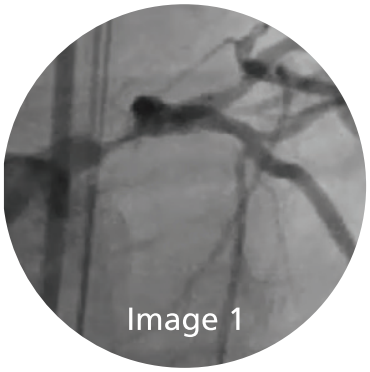


Image 1

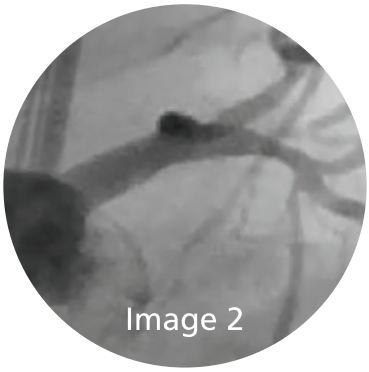


Image 2

Dr. Sabik: That is a great point. Indeed, in EXCEL we see that the secondary endpoint of death, stroke, or MI at 30 days occurred in 4.9 percent of PCI patients and in 7.9 percent of CABG patients, and this difference was highly statistically significant for superiority of PCI. In fact, other peri-procedural adverse events occurred less frequently in PCI compared to CABG patients: 8.1 percent versus 23 percent. PCI patients experienced fewer major arrhythmias, fewer infections and fewer blood transfusions. However, the tide reversed in the landmark analysis after 30 days. Between 30 days and three years, more primary endpoint events, particularly death and MI, occurred in PCI patients than CABG patients. Ischemia-driven revascularization was also higher in the PCI group than in the CABG group (12.6 percent versus 7.5 percent of the patients).

Dr. Simon: So the take home message from EXCEL is that the majority of patients with unprotected left main coronary artery disease, who are candidates for either procedure, can now be managed equally well by PCI or CABG with experienced interventional cardiologists and heart surgeons working in a collaborative heart team approach. Left main coronary artery disease may turn out to be a great example of personalized medicine. From the registry portion of the EXCEL trial, we learned that approximately 62 percent of patients with left main coronary artery disease are candidates for PCI, and approximately 80 percent are eligible for CABG. Therefore, decisions to proceed with PCI or CABG should be made by the heart team and patient taking into account the patient's anatomy, comorbidities and preferences.

Dr. Sabik: I think it is really critical for us to emphasize the importance of further follow-up of the patients at five years given the landmark analysis indicating increased events in the PCI cohort after 30 days. The presentation of the NOBLE trial at the same late-breaking clinical trials session at the TCT indicates that long-term follow-up is essential. Indeed, NOBLE concluded that PCI was inferior to CABG at five years. Although there are many trial design and device differences between EXCEL and NOBLE that may be responsible for the divergent outcomes of the two trials, we should encourage our readers and listeners to keep an eye out for the five-year EXCEL results.

Dr. Simon: Joe, thank you for your leadership in the EXCEL trial and your insights into the trial results. As classmates at Harvard Medical School, I can't tell you how thrilled I am to be working with you again after all these years. I know that you will play a leading role in driving our mission – To Heal. To Teach. To Discover. – as our Chair of Surgery at University Hospitals.

Image 1: 72 M hx of TIA presenting for concern of three hours of chest pain at rest, 7/10. Coronary angiogram reveals 90 percent left main stenosis and chronic total occlusion of the RCA.

Patient was considered a high-risk candidate for CABG and decision for PCI with circulatory support, Impella 2.5 L made.

Image 2: Result after a single drug-eluting stent in the left main 3.5 x 15 mm, post-dilated with a 4.5 mm balloon. The Impella was removed at the end of the procedure and the patient was discharged the next day in excellent condition.

DANIEL I. SIMON, MD

President, University Hospitals Cleveland Medical Center

Professor of Medicine, Case Western Reserve University School of Medicine

JOSEPH F. SABIK, III, MD

Chair, Department of Surgery, University Hospitals Cleveland Medical Center

Surgeon-in-Chief and Vice President of Surgical Operations, University Hospitals

Professor of Surgery, Case Western Reserve University School of Medicine

STATINS
Under-Prescribed in the Young
WITH SEVERE DYSLIPIDEMIA

A major driver of heart disease is high cholesterol, especially elevated levels of low-density lipoprotein (LDL) or "bad" cholesterol. Among drug therapies, statins are a highly effective first-line treatment for lowering cholesterol.

Although ongoing research explores how best to identify patients at intermediate risk for heart disease who may benefit from statins, the clear consensus is that patients with extremely high cholesterol levels (LDL > 190 mg/dL) should be prescribed a statin. Many of these patients have a genetic defect that drives cholesterol levels high enough that heart attacks, strokes and death can occur at young age without other risk factors.

Researchers from University Hospitals Harrington Heart & Vascular Institute used a national registry to examine statin prescription rates for these high-risk patients with severely elevated cholesterol. The study was designed to spot treatment gaps in real-world settings. They found that, nationally, many patients with extremely high cholesterol levels are not prescribed a statin. Among patients with LDL > 190 mg/dL who were prescribed least one medicine over three years, 34 percent were not prescribed a statin. Patients with even higher levels (LDL > 300 mg/dL) went without a statin prescription 25 percent of the time.

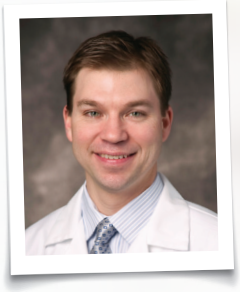
"In this study, doctors almost always prescribed a statin according to guideline recommendations for certain patients, particularly those with heart disease or diabetes or who were older," says David A. Zidar, MD, PhD, a cardiologist at UH Harrington Heart & Vascular Institute, Assistant Professor of Medicine at Case Western Reserve University School of Medicine and lead author of the study. "Efforts to raise awareness among heart attack victims seem to be working. But we should consider new prevention initiatives for patients with elevated cholesterol who are at high risk to develop heart disease prematurely."

Another observation from this study was that younger patients were far less likely to be prescribed a statin. "Current medical therapy for familial hypercholesterolemia, instituted in young patients, can normalize LDL levels and often be essentially curative," says Sadeer Al-kindi, MD, a co-author on the study. "Yet, ironically, youth was by far the most important factor associated with statin under-prescription for severe dyslipidemia. In those younger than 40 with severe dyslipidemia, less than 45 percent were ultimately prescribed a statin."

In familial hypercholesterolemia, severe cholesterol elevation results from a gene mutation. These patients have a 50 percent chance of passing the mutation along to children, and siblings are 50 percent more likely to have it. Screening relies on a lipid blood test not uniformly recommended. "If we are missing the boat among patients who are screened and identified, we are likely missing this trait among family members," says co-author Anthony DeCicco, MD. Additional contributors to this study included Jarrod Dalton, PhD; Chris Longenecker, MD; and Daniel I. Simon, MD.

From these national data, UH Harrington Heart & Vascular Institute is working on strategies to improve recognition of severe dyslipidemia and prevention of heart disease locally. "We hope to use these findings as a catalyst to design ways to improve detection and treatment of severe dyslipidemia in Northeast Ohio," Dr. Zidar says. "This is a rare case where guideline-recommended treatment can result in improved health outcomes and cost savings for patients and health systems."

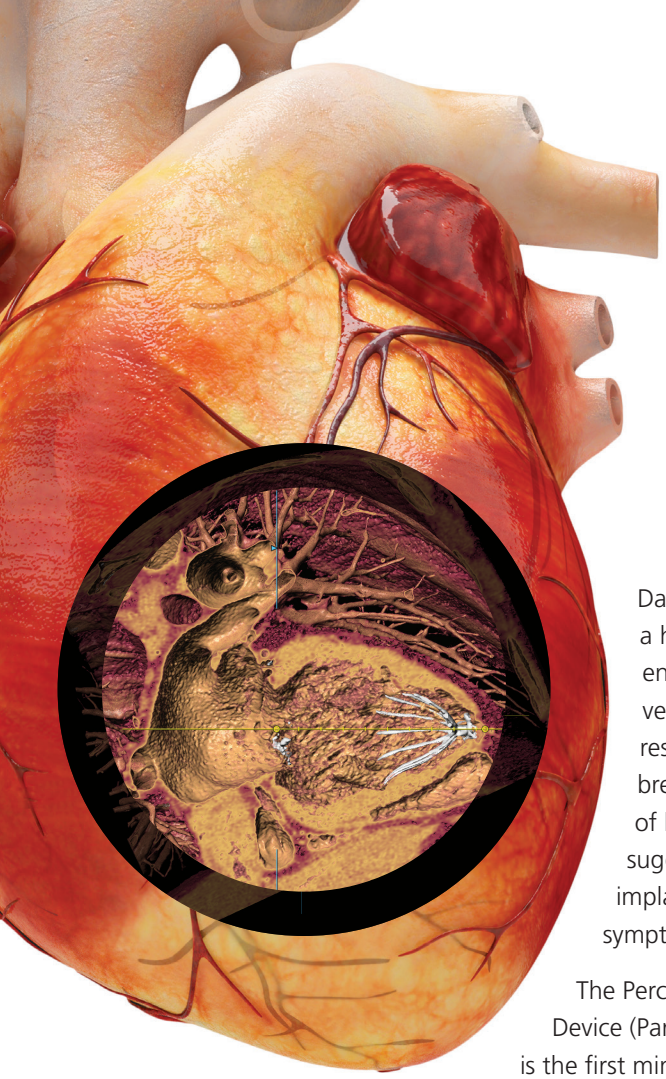
For more information or to refer a patient, call **216-844-3800** or email **HVInnovations@UHhospitals.org**.



DAVID ZIDAR, MD, PHD

Co-Director, LDL Apheresis Program
University Hospitals Harrington Heart & Vascular Institute

Assistant Professor of Medicine
Case Western Reserve University School of Medicine



A PARACHUTE for Ischemic Heart Failure

Damaged cardiac muscle after a heart attack can lead to heart enlargement and decline in ventricular performance. This may result in fatigue and shortness of breath, severely impacting quality of life. In these cases, studies suggest that an alternative implantable device can improve symptoms and quality of life.

The Percutaneous Ventricular Restoration Device (Parachute®), made by CardioKinetix, is the first minimally invasive treatment for such patients. This novel ventricular partitioning device (VPD) is implanted with a catheter inserted via the femoral artery. University Hospitals Harrington Heart & Vascular Institute is leading worldwide clinical investigation of this device, exploring its value for patients with reduced blood supply to the heart (ischemic heart failure).

In a 2016 study published in Catheterization and Cardiovascular Interventions, a team of UH researchers assessed the safety, feasibility and primary efficacy of VPD and found that the quality of implantation impacted clinical outcomes. The team concluded that implanting the Parachute device in the proper position is essential for good outcomes. The foot of the device must sit at the left ventricle (LV) apex with the nitinol struts anchored to the LV wall.

"Although still under FDA investigation, Parachute has emerged as a safe and feasible treatment option," says Hiram Bezerra, MD, PhD, the study's senior author, Director of the Cardiac Catheterization Laboratories at UH Cleveland Medical Center, and Associate Professor of Medicine at Case Western Reserve University School of Medicine. "It is the only percutaneous, nonsurgical mechanical intervention for heart failure."

Parachute separates damaged heart muscle from healthy muscle, and cardiac output and function of the LV can be restored. Patients remain awake during the procedure, which typically takes just 30 minutes in a cardiac catheterization lab and does not involve the risks associated with surgical alternatives. Early research results show the Parachute device may minimize hospital readmissions due to complications from heart failure.

Implanting the device requires a cardiac computed tomography (CCT) scan in advance. UH's Cardiovascular Imaging Core Laboratory receives all CCT images worldwide from the current clinical trial in the U.S. and commercial cases in Europe and Asia. UH researchers then recommend the size of Parachute device to be implanted. Marco Costa, MD, PhD, President of UH Harrington Heart & Vascular Institute, is the study's principal investigator.

"We're in a unique position of expertise by reviewing all CCT scans globally from this study," Dr. Bezerra says. "Each case passes through us before any of the devices are implanted. We can apply this great expertise to our own patients."

For more information or to refer a patient, call **216-844-3800** or email **HVInnovations@UHhospitals.org.**

HIRAM BEZERRA, MD, PHD

Director, Cardiac Catheterization Laboratories
University Hospitals Cleveland Medical Center

Associate Professor of Medicine
Case Western Reserve University
School of Medicine

GROWN-UP CARE
for Congenital Heart Disease

Creating the optimal care setting for adults with congenital heart disease

The number of adults living with congenital heart disease (CHD) has now surpassed the number of children living with the same, thanks to the last two decades of advances in surgical repair and medical treatment for CHD. However, the resources and specialists trained to specifically care for an adult population with this unique combination of congenital and acquired medical needs have not kept pace. As a result, many of these patients continue to see pediatric cardiac specialists well into their 30s and 40s.

Patients Caught Between Two Worlds

Imagine a patient who had surgery as an infant to correct a serious congenital heart defect, such as tetralogy of Fallot. As he grows, various additional corrective surgical and catheter procedures may be necessary to keep his heart functioning. As an adult, he will require additional cardiovascular care, both for his congenital heart disease and for the acquired heart disease that affects all of us with aging. Who is best to determine the cause and design the treatment plan – a pediatric congenital specialist or an expert in adult acquired heart disease?

The best answer is both. Leading institutions in cardiac care, including University Hospitals Harrington Heart & Vascular Institute and The Congenital Heart Collaborative at UH Rainbow Babies & Children's Hospital, now are building multifaceted programs that combine the often separate worlds of pediatric and adult cardiovascular care in a single location for this population. Led by physicians and staff with years of training and expertise in caring for congenital heart disease, these new adult congenital heart programs provide the optimal care setting.

Decades of Experience in Congenital Heart Disease

University Hospitals has assembled a team of experts to lead development of the comprehensive Adult Congenital Heart Disease (ACHD) Program, including Martin Bocks, MD, Director of Pediatric Interventional Cardiology, and Eric Devaney, MD, Chief of Pediatric Cardiothoracic Surgery, both at UH Rainbow Babies & Children's Hospital.

Dr. Bocks is a pediatric interventional cardiologist with training in internal medicine and pediatrics. As part of the first cohort of 198 physicians in the country to earn board certification in adult congenital heart disease from the American Board of Internal Medicine and the American Board of Pediatrics, Dr. Bocks has an unusual blend of training and experience that gives him unique expertise in cardiac catheterization procedures for adults with CHD. Dr. Devaney is a congenital heart surgeon with more than 15 years'

experience treating infants, children and adults with CHD, giving him extensive understanding of the surgical challenges presented by adults with CHD.

"These are complex patients who've had multiple previous operations," says Dr. Devaney. "The resulting anatomic and physiologic differences make this a unique and challenging population that requires special attention and expertise. Our team has a very strong core of experience in these areas."

The ACHD Program also includes Christopher Snyder, MD, Chief of Pediatric Cardiology at UH Rainbow Babies & Children's Hospital, a national leader in the field of congenital heart electrophysiology for both children and adults. A multidisciplinary team of ACHD experts, including nurse practitioners, nurses and social workers well-versed in the unique challenges of this population, are also part of the program.

A Focus on Integrated Care: Pediatric and Adult Cardiovascular Services

The ACHD Program is a new addition to the nationally recognized adult-focused UH Harrington Heart & Vascular Institute led by Marco Costa, MD, PhD, President of UH Harrington Heart & Vascular Institute. Although ACHD affects a relatively small population when compared to the total number of adults treated for acquired heart diseases, Dr. Costa, in partnership with The Congenital Heart Collaborative at UH Rainbow Babies & Children's Hospital, has dedicated significant support to developing a cross-cutting program that ensures this population receives the best care possible.

"The most successful ACHD programs have the ability to send their patients to the optimal location for care and form synergy between the pediatric and adult services," remarks Dr. Bocks.

"It is most beneficial when the pediatric and adult cardiology and surgery resources are both institutionally and physically linked, as is the case for our new ACHD Program."

Cross-Cutting Research and Device Development

An advantage of housing the program within UH Harrington Heart & Vascular Institute is the opportunity to closely connect leading-edge preclinical and clinical research underway there with the pediatric-focused cardiovascular research happening at UH Rainbow Babies & Children's Hospital. From the creation of bioresorbable stents to right-sized mechanical heart pumps, the congenital heart population's research and development can feed the formation of better treatments for acquired heart diseases, and adult congenital heart patients can be connected with national adult acquired heart disease clinical trials where applicable.

"UH Harrington Heart & Vascular Institute has made it a priority to be on the leading edge of cardiovascular research, including pioneering interventional and surgical techniques that will really benefit ACHD patients," Dr. Devaney remarks.

Life-Changing Impact on Patients

"Our first priority is to provide the highest quality of care for every patient with congenital heart disease, from infant to adult," he adds. "We now have all the elements necessary to be a regional and national powerhouse in caring for the increasing number of patients who are thriving well into adulthood in spite of congenital heart disease."

"Thanks to advances in care and treatment, it isn't just hoped that CHD patients will live into their 30s and 40s. For most, it's expected," says Dr. Bocks. "Now, it's our responsibility to have the knowledge and systems in place to care for them in the best way possible throughout their lives."

For physician referrals, please call Dianne Bolden at **216-286-ACHD** (216-286-2243). For more information on the UH Adult Congenital Heart Disease Program, please contact Dr. Bocks at **Peds.Innovations@UHhospitals.org**.

MARTIN BOCKS, MD, FACC

Director, Pediatric Interventional Cardiology

Director, Pediatric Cath Lab
University Hospitals Rainbow Babies & Children's Hospital

Associate Professor of Pediatrics
Case Western Reserve University School of Medicine

ERIC DEVANEY, MD, FACC

Chief, Pediatric Cardiothoracic Surgery
University Hospitals Rainbow Babies & Children's Hospital

Clinical Professor of Surgery
Case Western Reserve University School of Medicine

OCT: Bringing Heart Imaging to Light

Optical coherence tomography (OCT), a catheter-based invasive imaging system, uses light instead of ultrasound to produce high-resolution, real-time images of coronary arteries and deployed stents for patients with cardiovascular disease. OCT allows cardiologists to see details inside blood vessels that were never seen before, and the resulting images are almost to the level of a microscope in terms of resolution. The visualization can be more than 10 times the detail of intravascular ultrasound.

A team at University Hospitals Harrington Heart & Vascular Institute using intravascular OCT was able to rule out intraluminal thrombus, and thus further intervention, following a stent placement in the left anterior descending artery. Their findings, "Optical coherence tomography assessment ruled out the need for intervention in a 'hazy' angiographic image," were published in The International Journal of Cardiovascular Imaging in September 2016. The authors are Mohamad Soud, MD; Guilherme F. Attizzani, MD; Daisuke Nakamura, MD; Gabriel Tensol Rodrigues Pereira, Research Fellow; Setsu Nishino, MD, PhD; and Hiram G. Bezerra, MD, PhD. All are affiliated with UH.

They found that OCT's high resolution proved more accurate than intravascular ultrasound (IVU) in identifying intraluminal thrombus and that, compared to coronary angioscopy, OCT has 100 percent sensitivity versus 33 percent for IVUs in detecting intracoronary thrombus.

This advanced technology is shaping the future of cardiovascular imaging, and the Cardiovascular Imaging Core Laboratory at UH is leading the way in its use.

"For several years, OCT has been a routine part of our arsenal for coronary prevention," says Hiram Bezerra, MD, PhD, the study's senior author, Director of the Cardiac Catheterization Laboratories at UH Cleveland Medical Center, and Associate Professor of Medicine at Case Western Reserve University School of Medicine. "We use intravascular imaging in approximately 80 percent of our cases." Nationally OCT is used in roughly 5 to 10 percent of all coronary interventions.

OCT is useful as a diagnostic tool, offering excellent tissue characterization for plaque components and planning interventions. Therapeutically, this modality facilitates interventions by offering the most precise dimensions for device selection, which optimizes results after stenting by revealing things such as stent expansion and positioning. Biodegradable stents need even more precision in implantation than other types of stents do, and OCT offers that precision. OCT allows doctors to accurately measure luminal architecture and gain insights regarding stent placement and, in the case of biodegradable stents, information about the time it takes for them to dissolve.

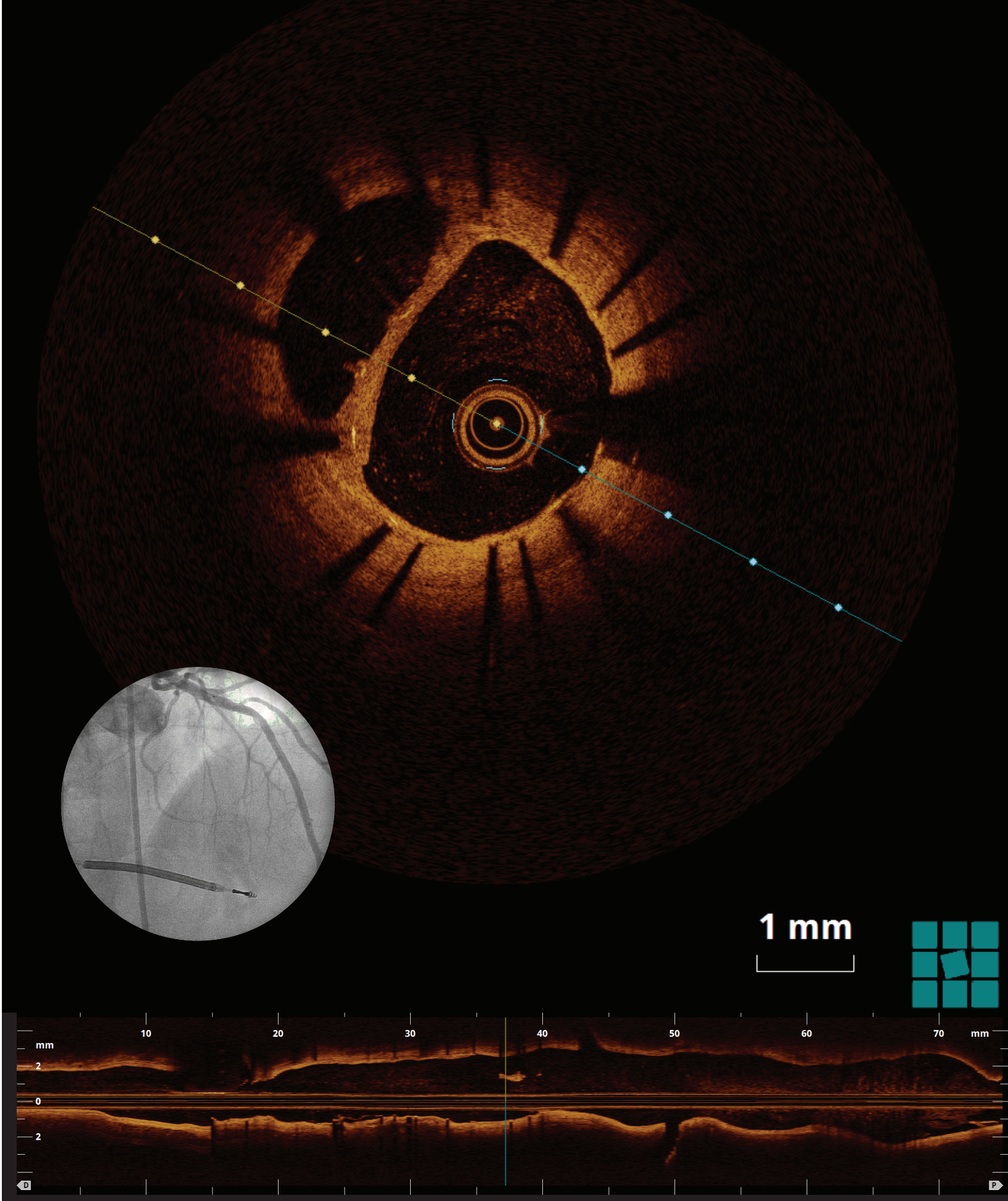
UH has been a pioneer in research and clinical use of OCT since its investigational phase. A UH team published a comprehensive review of intracoronary OCT in the Journal of the American College of Cardiology: Cardiovascular Interventions in 2009. The paper described the technical aspects of OCT and highlighted its then-emerging research and clinical potential. The authors were Dr. Bezerra; Marco A. Costa, MD, PhD; Giulio Guagliumi, MD; Andrew M. Rollins, PhD; and Daniel I. Simon, MD. UH Cleveland Medical Center was the first U.S. site to teach doctors to perform OCT and continues to be a training site.

For more information or to refer a patient, call **216-844-3800** or email **HVInnovations@UHhospitals.org.**

HIRAM BEZERRA, MD, PHD

Director, Cardiac Catheterization Laboratories
University Hospitals Cleveland Medical Center

Associate Professor of Medicine
Case Western Reserve University
School of Medicine


1 mm
10
20
30
40
50
60
70
mm
mm
2
0
2
D
P

LEADING THE WAY IN LEAD MANAGEMENT

DINA SPARANO, MD

Director, Lead Management Program
University Hospitals Harrington Heart & Vascular Institute

Assistant Professor of Medicine
Case Western Reserve University School of Medicine

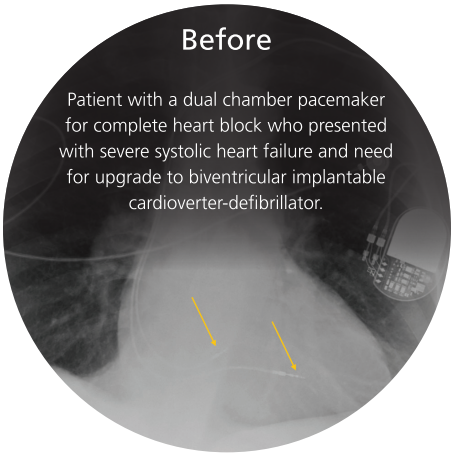
For the growing number of patients with cardiac implantable electronic devices (CIEDs) such as pacemakers and defibrillators, teamwork in their care is essential to achieving the very best outcomes. While many physicians implant these devices, fewer specialize in their extraction or management over time.

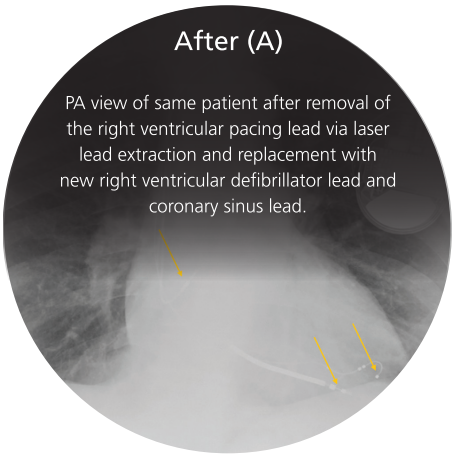
New approaches are needed to meet the increased need and bring new options to this patient population. To that end, the Electrophysiology Center at University Hospitals Harrington Heart & Vascular Institute has created a Lead Management Program, which offers expert consultation and management services. The program's expert staff offers a comprehensive approach to the complex care these patients require, for simple or complex cases.

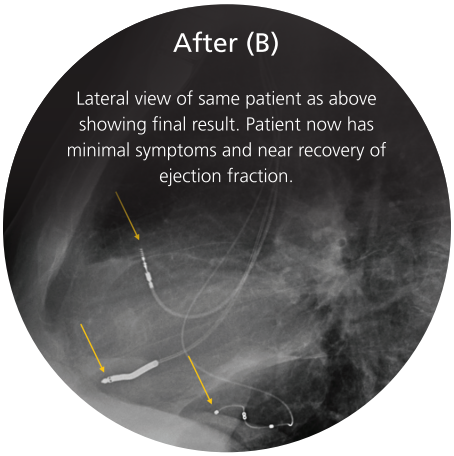
Lead management helps address challenges such as infection, device malfunction or the need for a device upgrade. Patients may experience issues related to venous access and occlusion, with inactive leads left inside the body, or with older systems incompatible with MRI procedures that may require replacing.

"We think of our work as 'lead management' because we believe that considering a full range of options is the right approach for the diverse needs of patient with CIEDs," says Dina Sparano, MD, Assistant Professor of Medicine at Case Western Reserve University School of Medicine, and the Lead Management Program Director. "Sometimes the right answer is not lead extraction but a less invasive intervention."

In cases when lead extraction is indicated, the UH team ensures that surgical support is present during the procedure. Throughout the case the surgical team is involved or on standby, along with dedicated cardiac perfusionists. The safety and efficiency of lead extraction procedures have improved dramatically and continue to do so as technology improves, as operators gain more experience and with the involvement of a specialty Lead Management Program team.







The program offers a Lead Management Clinic for referred patients and their families to have in-depth conversations about their cardiac devices and receive a comprehensive consultative experience.

Dr. Sparano compares this approach to that of oncology tumor boards to discuss the best approach to current cases.

"The program doesn't replace referring physicians' care," Dr. Sparano says. "We are partners in care and have specific expertise to offer when managing devices."

In addition to Dr. Sparano, the Lead Management Program team includes dedicated electrophysiologists Judith Mackall, MD, and Sergio Thal, MD; cardiac surgeons; anesthesiologists; infectious disease specialists; and University Hospitals' exemplary lab and operating room nurses and staff. Each patient's team also includes the referring physician, and all cases are discussed among the involved disciplines.

In the last year, the volume of lead extractions has grown at University Hospitals, with strong outcomes due in part to these collaborative relationships with other departments.

"Our number of cases exceeds the benchmark for national standards of expertise," Dr. Sparano says. "We have a zero mortality rate, and our complication rates are equal to the national rates of other high-volume centers."

Across the University Hospitals system, more than 10,000 clinic checks of cardiac devices occur each year, and even more cardiac device patients may be able to benefit from this comprehensive approach to care.

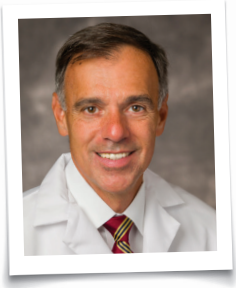
For more information, or to refer a patient, call **216-844-3800** or email **HVInnovations@UHhospitals.org**.

UNIVERSITY HOSPITALS
Marketing & Communications
MSC 9160
11100 Euclid Avenue
Cleveland, Ohio 44106

Team News

Mukesh K. Jain Named to the National Academy of Medicine

Mukesh K. Jain, MD, FAHA, Chief Scientific Officer for University Hospitals, has been elected to the National Academy of Medicine, becoming a member of a distinguished organization that has made important contributions to health, medicine and science. Election to the Academy is considered one of the highest honors in the fields of health and medicine, and recognizes individuals who have demonstrated outstanding professional achievement and commitment to service. This honor underscores Dr. Jain's role in shaping research and health policies that improve the lives of millions of people around the world.



Joseph F. Sabik III Recruited as Chair, Department of Surgery

Joseph F. Sabik III, MD, was selected as the new Chair of the Department of Surgery at UH Cleveland Medical Center. He also serves as the Surgeon-in-Chief and Vice President for Surgical Operations for the University Hospitals system. Dr. Sabik is one of the world's foremost chest and heart surgeons and a respected administrative leader. He comes to UH after more than two decades at Cleveland Clinic, where he has been Chairman of Thoracic and Cardiovascular Surgery since 2008. He has performed more than 8,000 heart surgeries and is a pioneer in minimally invasive cardiac surgery, multi-arterial coronary-artery bypass grafting, and heart valve repair and replacement. Dr. Sabik is equally strong as an academic. He is in demand worldwide as a lecturer, is widely published in leading professional journals and directed the Cardiothoracic Residency Training Program at the Clinic.

Sanjay Rajagopalan Joins as Chief, Division of Cardiovascular Medicine

Sanjay Rajagopalan, MD, was recruited as the new Chief of the Division of Cardiovascular Medicine at UH Cleveland Medical Center. Dr. Rajagopalan is an exceptionally accomplished clinician-scientist with nearly three decades of experience leading translational research at elite academic medical centers. He is renowned worldwide for his pioneering work in cardiovascular magnetic resonance imaging, and is one of the nation's experts in the study of cholesterol, air pollution and other environmental factors on lung, heart and vascular diseases. Before joining UH, he served as Co-Director of the Heart Center and Professor of Medicine since 2013 at the University of Maryland. He has also held academic positions at The Ohio State University; Mount Sinai School of Medicine, New York; University of Michigan, Ann Arbor; and Emory University School of Medicine, Atlanta.

Harrington Heart & Vascular Innovations

Contributors: Daniel Simon, MD; Joseph F. Sabik, III, MD; David Zidar, MD, PhD; Hiram Bezerra, MD, PhD; Martin Bocks, MD, FACC; Eric Devaney, MD, FACC; Dina Sparano, MD

Writer: Kelly Kershner **Designer:** Justin Brabander **Marketing Manager:** Tiffany Hatcher

Heart & Vascular Innovations is published by University Hospitals for physicians and should be relied upon for medical education purposes only. It does not provide a complete overview of the topics covered and should not replace the independent judgment of a physician about the appropriateness or risks of a procedure for a given patient.

To ensure you receive future cardiovascular-related communications from UH Cleveland Medical Center, please email HVInnovations@UHhospitals.org.

HVI 00703