

# Cardiovascular Report

NEWS FROM JOHNS HOPKINS MEDICINE

Winter 2017

## Atrial Fibrillation: Saying Goodbye to Blood Thinners

ONLY A THIRD OF PATIENTS WHO have atrial fibrillation (AF)—one of the most common arrhythmias—consider it to be a serious health problem, according to a 2009 survey conducted by the American Heart Association. However, because the disorder can cause blood to stagnate and clot, it significantly elevates the risk of stroke.

To combat this possibility, those with AF are often prescribed blood thinners, but patient misconceptions about the risks associated with their condition lead many to eschew these lifesaving drugs. Other patients can't take blood thinners at all due to inherent problems with clotting or other risk factors, such as a history of falls.

"It's striking that of all AF patients who should be on anticoagulation therapy, only half are actually taking blood thinners," says **Hugh Calkins**, director of Johns Hopkins' Cardiac Arrhythmia Service.

There are, however, nonpharmacologic options



To reduce stroke risk in certain patients with atrial fibrillation, members of the Johns Hopkins Cardiac Arrhythmia Service implant the latest crop of left atrial appendage occlusion devices, an alternative to using blood thinners. From left, Kaushik Mandal, director of the Robotic Cardiac Surgery and Minimally Invasive Arrhythmia Surgery Program; Ronald Berger, co-director of cardiac electrophysiology; and Hugh Calkins, director of the Cardiac Arrhythmia Service. Not pictured is Jon Resar, director of interventional cardiology.

that can also significantly reduce an AF patient's risk of stroke. Decades ago, cardiac surgeons found that if they closed off the left atrial appendage (LAA)—a windsock-shaped outpouching in the muscle wall of the left atrium that collects blood and drains into the

heart—by stapling, tying and other means, patient stroke risk shrank to baseline.

More recently, Calkins explains, three cardiac implant devices have come on the market that offer safer and more reliable means to achieve the same goal, with each option offering distinct benefits and drawbacks. To make the best recommendations for treatment with these devices, Johns Hopkins initiated the Left Atrial Appendage Occlusion Program to help evaluate which option is optimal for each patient. Although many institutions offer at least one of these options, he adds, Johns Hopkins is one of only a few that offer all three.

The first of these implantable devices, the WATCHMAN, is the only one that's currently FDA-approved for LAA occlusion. Shaped like a small umbrella, it's delivered via catheter to block the opening to the LAA. However, this device is only suitable for patients whose LAA is a certain size and shape, Calkins says. In addition, patients must take blood thinners for several weeks after surgery, a disqualifier for those with clotting problems and other risks.

The second device, the AtriClip, is implanted using minimally invasive techniques. Surgeons place this bobby pin-shaped clip at the base of the LAA, preventing blood from entering. Although no blood thinners are required after the procedure, Calkins notes, the minimally invasive approach disqualifies some patients who've had

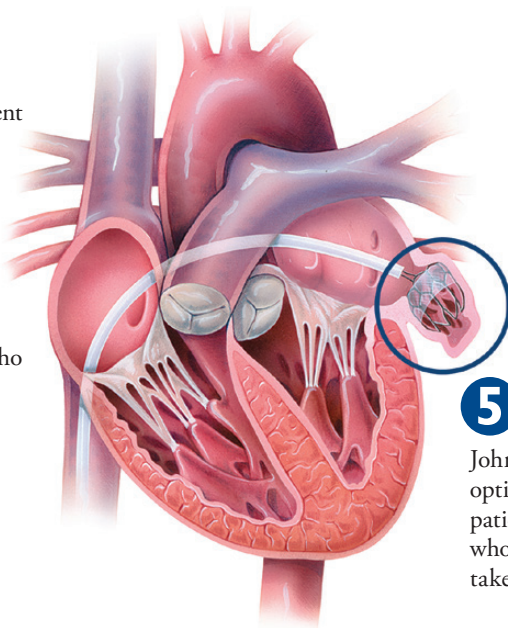
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### Johns Hopkins Left Atrial Appendage Occlusion Program

**1** Data show that more than 90 percent of clots found in the left atrium are formed in the LAA.

**2** Oral anticoagulation is the gold standard for stroke prevention in AF patients who are at increased stroke risk.

**3** However, many patients are not willing or able to take blood-thinning medication due to risk of bleeding, risk of falls and/or patient preference.



**4** Lapses or cessation of anticoagulant medication greatly increase the likelihood of stroke during the period of time a patient is not adequately anticoagulated.

**5** Johns Hopkins now has new options for stroke prevention in AF patients at increased risk of stroke who are unwilling or unable to take anticoagulation medication.

Watch a videotaped Q&A with Hugh Calkins on atrial fibrillation:  
[bit.ly/laaocclucalkins](http://bit.ly/laaocclucalkins)



## A Cohesive Path to Managing Peripheral Artery Disease

**F**OR MANY PATIENTS WITH PERIPHERAL artery disease (PAD), the early signs of these blockages that typically target blood vessels in the legs are nearly imperceptible—a twinge while climbing up stairs or after a long walk and pain with exercise. Eventually, that pain, also known as claudication, progresses to persistent discomfort, even while at rest. Finally, these insidious symptoms become impossible to ignore, morphing into ulcerations on the feet or even gangrene that requires amputation.

But this doesn't have to be the story for most people with PAD, say Johns Hopkins vascular surgeons **Ying Wei Lum** and **Christopher Abularrage**, who specialize in treating this condition. Personalized care with a team approach can preserve patients' limbs, function and quality of life.

As part of a patient's first visit, schedulers ensure that the patient is seen as quickly as possible by the appropriate specialists. In this multidisciplinary approach, the specialists seen may include vascular surgeons, surgical podiatrists, wound care experts and often endocrinologists, because PAD is frequently a consequence of poorly controlled diabetes.

Appointments typically include testing in the Intersocietal Accreditation Commission-accredited Johns Hopkins Noninvasive Vascular Laboratory



**Christopher Abularrage**



**Ying Wei Lum**

to confirm the diagnosis and extent of PAD in the patient. Studies conducted may involve physiological testing of the legs—including an ankle brachial index with waveform analysis—to give an overall diagnosis of the extent of the disease or a duplex ultrasound to view the anatomy and the blood flow within the different arteries to determine the precise location of the disease.

Once Lum and Abularrage interpret these findings, they and other members of the team suggest a treatment plan. For those in the early stages of PAD, Abularrage explains, conservative management is often enough to permanently prevent a patient's disease from progressing. "Exercise therapy, controlling blood pressure and cholesterol, managing blood sugar, or smoking cessation may be all that many patients need," he says. "It's important not to overtreat."

As patients develop rest pain, ulcers and tissue death—symptoms of critical limb ischemia—treatments become more aggressive. For short blockages, angioplasty and stents can be placed with endovascular techniques. Longer blockages require a surgical bypass. For intermediate-sized blockages, Lum is leading Johns Hopkins' efforts in a multicenter trial known as BEST-CLI to investigate which of these therapies is the most appropriate.

A central goal in very advanced cases, marked by ulceration and gangrene, is to help patients avoid amputation, Lum says.

As patients follow up after treatment—every three to six months for the first year, then less often if their recovery is progressing well—the focus of the entire team is to help them live full lives, Abularrage says. "People want to play golf, walk without pain," he notes. "The goal is to get them back to normal life." ■

## A Heart That's Fit to Print

**T**HE RE-CREATION OF HEART muscle that's been lost to ischemia is one of the loftiest goals of tissue engineering—and one of the most

needed, with about 735,000 Americans suffering a cardiac infarction each year, according to the Centers for Disease Control and Prevention. Although researchers have used stem cell injection or biodegradable synthetic scaffolds for heart muscle regeneration, these methods are still suboptimal: Only a fraction of stem cells are retained in the heart, and heart tissue generated using a scaffold lacks the full functionality of native muscle.

Enter the research of Johns Hopkins cardiac surgeon **Narutoshi Hibino** and his colleagues, who recently began working with a 3-D printer specifically designed to pattern cells that can be layered into tissue. Using human-induced pluripotent stem cells, the Hibino lab plans to design lab-grown heart muscle without the use of synthetic scaffolds, creating a ready-to-use material that can provide more efficient heart muscle regeneration. "This is a very exciting field that could have a big impact on patients' lives," Hibino says. ■



**Narutoshi Hibino**



Learn more about PAD:  
[bit.ly/PADknowyourrisk](http://bit.ly/PADknowyourrisk)  
[bit.ly/PADavoidinglegamp](http://bit.ly/PADavoidinglegamp)



Learn more: [bit.ly/hibinolab](http://bit.ly/hibinolab)

### HERITABLE CONDITIONS

## Getting to the Heart of Inherited Cardiac Disease

**S**OME PATIENTS COME TO JOHNS HOPKINS' CENTER for Inherited Heart Disease after experiencing puzzling and frightening episodes, such as fainting from an abnormal cardiac rhythm or being resuscitated after a sudden cardiac arrest. Others come after a family member dies unexpectedly from a previously unknown cardiac condition. Either way, says **Gordon Tomaselli**, chief of Johns Hopkins' Division of Cardiology and co-director of the Heart and Vascular Institute, they come for answers and to set up a long-term plan to help themselves and anyone in their family who might also be affected.

The center, Tomaselli explains, follows Johns Hopkins' long history of research and treatment for heritable conditions, starting with Johns Hopkins geneticist Victor

McKusick's groundbreaking work in the late 1950s. Here, a multidisciplinary team of specialists cares for patients of all ages, streamlining care for members of the same family affected by the same conditions, including hypertrophic, restrictive, arrhythmic and dilated cardiomyopathies; rhythm disorders, such as Long QT and Brugada syndromes; familial cardiac amyloid; and connective tissue disorders that cause heart or heart valve malformations, such as Marfan and Loays-Dietz syndromes.

Many of these conditions predispose patients to sudden cardiac death, making it particularly crucial for patients to be cared for by a team of experts in these diseases. "These are obviously profoundly important problems, and ones that practitioners in the community can be a little leery of because the stakes are very high," Tomaselli says.



# A Lifesaving Collaboration

**F**OR **Glenn Whitman**, WHO DIRECTS Johns Hopkins' cardiovascular surgical intensive care unit (CVSICU), putting patients on an extracorporeal membrane oxygenation (ECMO) machine—a life support system that temporarily replaces the function of the heart and lungs—is a regular occurrence. But neither Whitman nor the CVSICU had ever before had a patient like Zachary Burroughs.

On June 30, 2015, Zach—then a 17-year-old student at Northeast High School in Pasadena, Maryland—was belted into the front passenger seat of a friend's car when it slid off the road and into a tree. When he arrived at the Johns Hopkins Children's Center that night, exams and imaging revealed that he had a traumatic brain injury, a collapsed right lung, multiple right rib fractures, pelvic fractures, a scapular fracture, a sacral fracture, a small liver laceration, and strained ligaments in his upper and lower spine.

The traumatic brain injury took top priority, so Zach's first stay was in the neuroscience critical care unit (NCCU), where a team of neurologists and neurosurgeons worked to keep his life-threatening brain injury from worsening. There, surgeons implanted an intracranial pressure monitor to keep tabs on the intense swelling that had occurred as his brain responded to the force of the accident.

Soon, however, it became clear that Zach's lungs were in equally critical condition: Trauma from the accident had rendered them unable to sufficiently oxygenate his blood. That's when his multidisciplinary team of caregivers decided to place him on ECMO and send him to the CVSICU.

Whitman, who helped oversee Zach's care in the CVSICU, has years of experience caring for patients on ECMO. But what he and others in the unit lacked, he says, were the experience and in-depth

knowledge necessary to care for patients with a brain injury as severe as Zach's.

"The types of injuries common in the NCCU are extremely uncommon in our unit," Whitman says. "Zach's care required continuous collaboration with our colleagues in the NCCU, who helped us manage his brain while we managed the rest of him."

While Zach stayed on ECMO for the next 33 days, neurologists and neurosurgeons from the NCCU relayed information to Whitman; **Christopher Sciortino**, the director of ECMO; and their colleagues in the CVSICU by phone and through in-person conferences. It was a true balancing act, Whitman remembers, as the two



**Glenn Whitman**

ICUs worked together to make sure that Zach's blood was sufficiently anticoagulated for ECMO without causing hemorrhage into his brain and to keep his blood pressure high enough to keep his brain perfused, but low enough to prevent extreme swelling.

Day by day, the team made it through issue by issue—for example, when Sciortino and the surgical team performed an urgent thoracotomy when Zach's right chest filled with blood, while the ICU helped him fight a high fever that lasted for days. Eventually, after nearly two months in the hospital, Zach left the CVSICU for inpatient rehabilitation at the nearby Kennedy Krieger Institute.

Today, Whitman says, Zach has made a full recovery.

"We couldn't be more pleased for him and his family," Whitman adds, "or more proud that we were able to help make this happen." ■



Learn more about ECMO at Johns Hopkins: [bit.ly/ECMOstory](http://bit.ly/ECMOstory)

## Atrial Fibrillation: Saying Goodbye to Blood Thinners

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previous cardiac surgery, due to scar tissue that can hinder implantation.

The third device, the LARIAT, is a catheter-implanted suture delivery loop that ties off the LAA. Although this procedure also doesn't require postoperative blood thinners, it's not suitable for patients whose LAAs are very large or in certain positions.

The only way to determine whether an AF patient is eligible for one of these devices is to come to Johns Hopkins for

**"It's striking that of all AF patients who should be on anticoagulation therapy, only half are actually taking blood thinners."**

—HUGH CALKINS

an appointment, says Calkins. There, he adds, a multidisciplinary team—including imaging experts, electrophysiologists, interventional cardiologists, cardiac surgeons and others—will examine the patient and determine the best options.

Once one of the devices is in place, Calkins notes, no permanent use of blood thinners is necessary ever again to treat the consequences of AF: "We're proud to offer these very liberating options for our patients." ■



To explore if your patients are eligible, call **443-287-3471**.

**"These are obviously profoundly important problems, and ones that practitioners in the community can be a little leery of because the stakes are very high."**

—GORDON TOMASELLI

**The Johns Hopkins Center for Inherited Heart Disease, says Gordon Tomaselli, brings together a host of experts to streamline care for members of the same family affected by a heart ailment.**

At a patient's first visit, he explains, physicians and other providers at the center carefully examine medical records and take a detailed family history to determine whether the patient's heart problems are heritable or acquired. They also perform a battery of tests that can include electrocardiogram, stress testing, cardiac CT, cardiac MRI or heart biopsy.

For some patients and family members, genetic testing is also an important step to consider. With its own group of genetic counselors and a strong relationship with Johns Hopkins' McKusick-Nathans Institute of Genetic Medicine, the center helps these patients and their families to decide whether to pursue genetic testing to identify the likelihood of their developing cardiac disease.

However, although genetic testing can be extraordinarily helpful in some circumstances, results aren't always definitive because researchers haven't yet identified the thousands of possible variants associated with genetic heart diseases, says Tomaselli.

"Our genetic counselors often explain that if we do genetic testing, it doesn't always mean that we identify the problem. It may, in fact, cloud the picture," he adds.

Even when genetic testing does not yield definitive findings, doctors at the center can advise patients on treatment options. For some patients, treatment may be as conservative as lifestyle changes or medications. For others, more aggressive interventional measures may be needed, such as implanted defibrillators or pacemakers, surgery to replace blood vessels, select denervation of the heart or heart transplantation.

"The fact that someone carries a genetic variant that causes heart disease isn't a death sentence," says Tomaselli. "We help patients manage their disease in ways that can give them a normal life expectancy and quality of life." ■



Learn more: [bit.ly/centerforinheritedhd](http://bit.ly/centerforinheritedhd)



# Jennifer Lawton Appointed Cardiac Surgery Chief

**Jennifer Lawton** has been appointed professor and chief of the Johns Hopkins Division of Cardiac Surgery. She is also director of the Cardiac Surgery Research Laboratory and will help lead the cardiothoracic fellowship training program in 2017.

Supporting American Heart Association (AHA) efforts, Lawton has spent much of her career raising awareness about heart disease as the leading cause of death for adult women in the United States.

A specialist in adult cardiac surgery, Lawton also performs innovative procedures, such as minimally invasive valve and off-pump coronary artery surgery (a variation of coronary artery bypass graft surgery without the use of the heart-lung machine), that have demonstrated better postoperative results for women.

She has many clinical research interests, including gender differences in cardiac sur-

gery. As a funded surgeon-scientist, Lawton studies protection of the heart muscle by examining the responses of isolated heart cells in response to stress and the role of a cardioprotective ion channel in the heart.

Her leadership roles have included chair of the AHA's basic science surgery study section and vice chair of the Accreditation Council for the Graduate Medical Education Thoracic Residency Review Committee, among others.

Lawton earned her M.D. from Hahnemann Medical College. She went on to complete her surgical residency at the Medical College of Virginia and a cardiothoracic surgery fellowship at Penn State Milton S. Hershey Medical Center. Before joining Johns Hopkins, Lawton was at Washington University for 15 years. ■



Learn more about Jennifer Lawton : [bit.ly/jlawtonmd](http://bit.ly/jlawtonmd)

## Your Vital Links

### Cardiovascular Access Team

To refer patients for cardiovascular services  
443-997-0270

### Cardiac Surgery

410-955-2800

### Vascular Surgery and Endovascular Therapy

410-955-5165

### Pediatric Cardiology

410-955-9714

### Online Referral Directory

[hopkinsmedicine.org/doctors](http://hopkinsmedicine.org/doctors)

### CareLink

Access to your patients' electronic medical records  
[www.hopkinsmedicine.org/carelink](http://www.hopkinsmedicine.org/carelink)

### Hopkins Access Line (HAL)

Your 24/7 connection with Johns Hopkins full-time faculty members in any specialty  
410-955-9444 or 800-765-5447

### Suburban Hospital

For patients needing cardiac services in the Washington, D.C., region  
301-896-7610

### Johns Hopkins Medicine International

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# Cardiovascular Report

The Johns Hopkins Heart and Vascular Institute *Cardiovascular Report* is one of the many ways we seek to enhance our partnership with our thousands of referring physicians. Comments, questions and thoughts on topics you would like to see covered in upcoming issues are always welcome. Contact [jminkov2@jhmi.edu](mailto:jminkov2@jhmi.edu).

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