



Oklahoma Heart Institute

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Combining New Technologies with Top Doctors

By Wayne N. Leimbach, MD, FACC, FSCAI, FCCP, FAHA

Acute Management of Deep Vein Thrombosis

By Eugene Ichinose, MD, FACC

Reducing Stroke in Atrial Fibrillation

By Greg Cogert, MD, FACC, FHRS

OHI Services in South Tulsa

By Robert Smith, Jr., MSc, MD, FACC, FSCAI

Celebrate Spring Whole Heart Healthy Recipes

Image Makers.

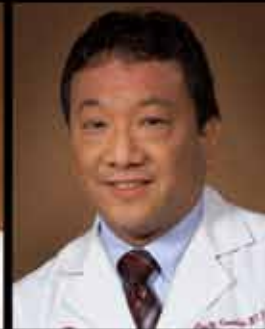
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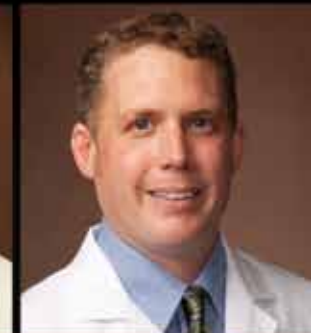
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The Oklahoma Heart Institute Magazine is mailed directly to referring physicians and other referring health care professionals in the Tulsa area and is also available in our patient waiting rooms.

4 Combining New Technologies with Top Doctors

By Wayne N. Leimbach Jr., MD, FACC, FSCAI, FCCP, FAHA



8 Acute Management of Deep Vein Thrombosis

By Eugene Ichinose, MD, FACC

10 Oklahoma Heart Institute Living Proof

By Elaine Burkhardt

15 Reducing Stroke in Atrial Fibrillation

By Greg Cogert, MD, FACC, FHRS

18 OHI Services in South Tulsa

By Robert Smith, Jr., MSc, MD, FACC, FSCAI

22 Celebrate Spring Whole Heart Healthy Recipes



 *to our readers*



Despite increasing government and third party restrictive regulations, the field of cardiology continues to see major advances in the treatment of cardiovascular disease. The field is changing so rapidly that many doctors and patients are unaware of all the newer and improved therapies that are now available.

This issue of Oklahoma Heart Institute Magazine is devoted to highlighting the numerous advances that have been incorporated into the diagnostic and therapeutic options offered by Oklahoma Heart Institute at its two main locations — the Oklahoma Heart Institute Hospitals in mid-town and at Hillcrest Hospital South.

I hope you find these articles informative and useful and strongly welcome any comments or suggestions.

Wayne Leimbach

Sincerely,
 Wayne N. Leimbach, Jr., M.D.
 Editor, Oklahoma Heart Institute Magazine



ON THE COVER

“Tulsa’s Art Deco 11th Street Bridge”
 Photo by John Shoemaker, photographer

Combining New Technologies with Top Doctors

By Wayne N. Leimbach Jr., MD, FACC, FSCAI, FCCP, FAHA

Continued on p. 6






Oklahoma
Heart Institute



Continued from p. 4

Cardiology has entered a new renaissance, and major improvements in cardiac care are now available to patients, which provide better outcomes often with less risk.

Oklahoma Heart Institute (OHI) has made major investments in technology and has aggressively recruited skilled specialists from the leading academic centers to bring the latest advances in care to Northeastern Oklahoma.

From prevention, to diagnosis, to treatment, Oklahoma Heart Institute (OHI) offers the latest therapies.

The Division of Structural Heart Disease is lead by Dr. Kamran Muhammad, who was recruited from the Cleveland Clinic. His program offers nonsurgical aortic valve replacement using a new balloon expanded stent valve.

The new procedure is for patients who are elderly and considered too high of a risk for standard aortic valve surgery. Prior to the new stent valve procedure, these patients experienced a 50%, 1-year mortality rate. The new procedure

Oklahoma Heart Institute heart hospital's new state of the art hybrid lab combines the complex imaging capabilities of a cath lab with the full operating options needed for cardiovascular surgery. This is where the Transcatheter Aortic Valve Replacement (TAVR) procedures are performed.

is called Transcatheter Aortic Valve Replacement (TAVR). The new valve is placed through a catheter either introduced via the femoral artery or via the left ventricular apex. Studies have shown significant reductions in mortality rate with this procedure. Patients often go home in 3 to 5 days post procedure.

In order to provide the TAVR procedure, Oklahoma Heart Institute had to build a new state of the art hybrid cath lab, which combines the complex imaging capabilities of a cath lab with the full operating options needed for cardiovascular surgery.

The structural heart program at Oklahoma

Heart Institute provides cath lab therapies instead of surgical corrections for many patients with holes in their hearts (ASD, PFO, VSD) or for closure of shunts (PDAs and AV fistulas).

The Interventional Cardiology Division performs complex angioplasty and stent procedures using advanced imaging modalities like IVUS, OCT, and NIR InfraRed Spectroscopy to help cardiologists better understand the vessel anatomy and pathology so that optimal therapy will be provided.

In addition, carotid stenting and peripheral balloon angioplasty and stenting provide patients with options besides surgery and also provide op-



tions to patients who are not candidates for surgical corrective procedures.

The Electrophysiology Division of Oklahoma Heart Institute has been a pioneer in ablation therapies for atrial fibrillation and reports high success rates for cryoablation and radiofrequency ablation techniques.

In addition, patients with chronic atrial fibrillation who cannot take anticoagulants for stroke prevention can often be treated with the Lariat Device to ligate the left atrial appendage.

Other newer treatment strategies include those offered by the venous interventionalists at OHI. New aggressive therapies for patients with deep venous thrombosis (DVT) significantly reduce the risk of patients developing a post thrombotic syndrome (where the patient ends up with a swollen, painful leg for the rest of their life.)

The heart failure specialists at Oklahoma Heart Institute provide not only newer in-patient therapies, but also operate a very successful outpatient clinic with advanced therapies including outpa-

tient aquapheresis for those patients resistant to diuretics.

In the area of diagnosis, OHI has the largest cardiac and vascular MRI program in the state and one of the largest in the United States. Under the direction of Dr. Ted Martin, patients with cardiomyopathies, aortic abnormalities, and with other vascular abnormalities can have detailed imaging of their problems and with no radiation risk.

Dr. Victor Cheng was recruited from Cedar Sinai in California to develop the new cardiac CT program at Oklahoma Heart Institute. This state of the art CT scanner will provide noninvasive imaging of the heart, its blood vessels, and the blood vessels throughout the body with greater details and much less radiation.

One of the greatest aspects of cardiology is that prevention truly works. Dr. Eric Auerbach and Dr. Ralph Duda help combine the specialties of cardiology and endocrinology to develop an outstanding prevention and wellness clinic. Patients with difficult to control risk factors gain access to

some of the latest therapies for cholesterol reduction and aggressive diabetes management.

Finally, Oklahoma Heart Institute continues to provide a robust clinical research program which allows patients to participate in research trials that give them access to the latest therapies which may not be clinically available to the public for 5 to 10 years from now.

At Oklahoma Heart Institute, there are many more new therapies that we anticipate becoming available within the next few years. Our goal is to continue to make the needed commitments necessary to rapidly bring the future of cardiology to Northeastern Oklahoma. ❤️

Wayne N. Leimbach, Jr. is a specialist in interventional cardiology, including cardiac catheterization, coronary angioplasty, percutaneous closure of PFOs & ASDs, and related interventional procedures such as stents, atherectomy, laser, intravascular ultrasound imaging and direct PTCA for acute myocardial infarction.

Acute Management of Deep Vein Thrombosis

By Eugene Ichinose, MD, FACC

A 50-year-old male truck driver from Vinita, Oklahoma presents to his primary care office with a swollen painful leg. This developed sometime over the weekend after completing a drive from Atlanta, GA. He denies shortness of breath and chest pain.

He is sent to the emergency room for vascular ultrasound with concerns for a deep vein thrombosis. The study demonstrates a noncompressible area in the common femoral vein. He is placed on anticoagulation therapy, compression hose and has a follow up appointment with his primary care physician. He will probably not have a pulmonary embolus with this therapy, but will have a 20% to 50% chance of going on to develop a post-thrombotic syndrome.

Venous thromboembolism is a major public health issue resulting in two major complications: pulmonary embolus and post thrombotic syndrome. In 2006, the surgeon general declared a federal call to action against this disease.

Each year, 300,000 to 600,000 people in the United States have a DVT/PE (1 to 2 per 1,000, and in those over 80 years of age, as high as 1 in 100). It carries a high mortality rate. An estimated 60,000-100,000 Americans die of DVT/PE annually. Ten to 30% of people will die within one month of diagnosis. Sudden death is the first symptom in about one-quarter (25%) of people who have a PE. One-half of patients with a DVT will have long-term complications (post-thrombotic syndrome) such as swelling, painful leg discoloration, and scaling in the affected limb. One-third (about 33%) of people with DVT/PE will have a recurrence within 10 years (1).

The following article will address new technologies affecting at least 3,000 Oklahomans each year.

The deep venous system of the lower extremities is the anatomical culprit of this disease process. With the development of thrombus in the vein, there is obstruction and the creation of a highly inflammatory environment. This causes permanent damage to the vein valves, which ultimately results in reflux and the progression of venous insufficiency involving pressure and pain, edema, hyperpigmentation, and venous ulcers. This is called the post thrombotic syndrome. It is the cause of at least 40% of the cost involving venous thromboembolism. Since there is no definitive cure for post thrombotic syndrome, it needs to be prevented.

Each year, 300,000 to 600,000 people in the United States have a DVT/PE, which carries a high mortality rate.

The presence of an iliofemoral deep vein thrombosis predicts a higher risk of a poor clinical outcome in comparison to less extensive proximal DVT. Full anticoagulation of a patient with iliofemoral deep vein thrombosis prevents thrombus extension, pulmonary embolus and death from PE, and reduces risk for recurrent venous thrombosis (2).

The use of knee-high graduated elastic compression stockings (30-40mmHg) for 2 years after the first episode of proximal DVT was found to reduce the frequency of PTS by 50% (3).

Despite optimal anticoagulation and compression therapy, the post thrombotic syndrome occurs in 20 and 50% of patients. However, there is hope. In studies where patients received anticoagulation for DVT and had rapid clot lysis, valvular reflux, venous obstruction, recurrent venous thromboembolic events and post thrombotic syndrome were greatly reduced. The key to success is rapid clot lysis during the initial presentation.

THE EVOLUTION OF THROMBOLYTIC THERAPY FOR DVT

Systemic infusion of thrombolytics: 13 studies have been reported from 1960-1990 comparing plasminogen activators, thrombolytics, versus heparin. A Cochrane analysis and a meta-analysis of systemic thrombolytic therapy for acute DVT found improved clot removal at an increased risk of bleeding (4). Although this approach reduces the clot burden more effectively than heparin, major bleeding is increased up to 14%. Therefore, systemic thrombolytic is not recommended in the treatment of routine iliofemoral deep vein thrombosis.

CATHETER DIRECTED THERAPY

How much more effective would it be to directly infuse thrombolytic agents directly into the venous thrombus via a catheter? This would allow a higher drug concentration to interact with the clot. In a study by Camerota, patients successfully treated had fewer post thrombotic syndrome symptoms and improved quality of life at 16 months follow-up (5). In a small trial there was a higher rate of normal physiological venous functions and less valvular reflux with catheter directed lysis versus anticoagulation alone. (6,7)

In a 473 patient prospective multicenter registry using urokinase catheter directed infusion, fibrinolysis was successful in 88% of the patients with iliofemoral deep vein thrombosis. It was more successful in patients with more recent, <14d, onset of symptoms. However, there was a major bleeding rate of 11.4%. (8)

Figure 1
Trellis-8 Peripheral Infusion System

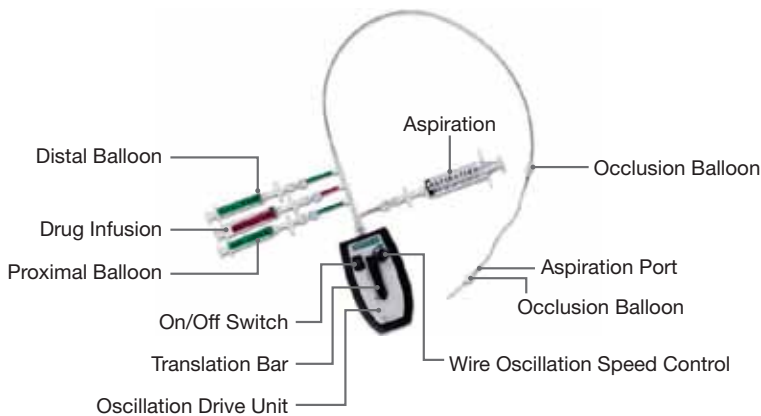
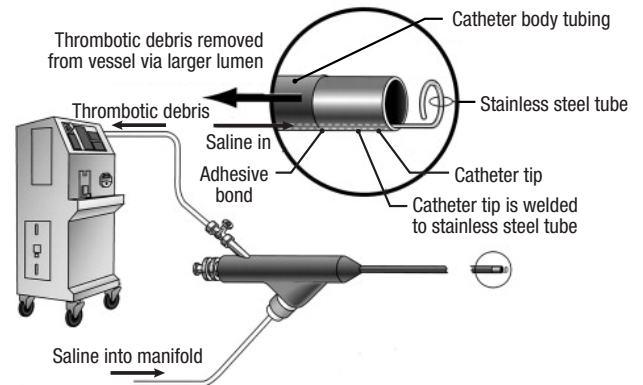


Figure 2
Angiojet Thrombectomy System



Oklahoma Heart Institute offers acute treatment of deep vein thrombosis with pharmacomechanical thrombolytic therapy and assistance in management of chronic venous insufficiency.

With the growing body of evidence supporting the effectiveness of reducing post thrombotic syndrome with catheter directed therapy (9), the results are most effective when treated within 14-21 days of onset of symptoms; however, there remains long infusion times and high bleeding rates.

Further improvements have now been achieved with newer techniques for treating iliofemoral deep vein thrombosis. These new devices incorporate a combination of low dose thrombolytic to reduce bleeding risk to the patient, and a mechanical component to mix the thrombus with the thrombolytic. These devices can localize thrombolytic exposure to a segment of the vein, mechanically fragment the thrombus and aspirate the thrombus and lytic solution. This should lessen the patient treatment time, reduce the patient's bleeding risk and reduce the patient's risk of post thrombotic syndrome.

Oklahoma Heart Institute is offering acute treatment of deep vein thrombosis with pharmacomechanical thrombolytic therapy and assistance in management of chronic venous insufficiency. The pharmacomechanical thrombolytic therapy is performed in the Oklahoma Heart Catheterization Lab using the Trellis™ peripheral infusion system and the Angiojet thrombectomy system.

The Trellis™ peripheral infusion system isolates the thrombus within the vessel with two

occluding balloons, thrombolytic medication is infused between the balloons. Next, catheter oscillates, mixing the thrombolytic drug into the blood clot. Finally, the thrombolytic drug and dissolved portion of the clot is aspirated through the Trellis™ catheter. (Figure 1)

The Angiojet thrombectomy system uses a pulse spray pharmacomechanical thrombolysis used to treat DVT. First, thrombolytic medication is infused within the clot, next a catheter vigorously sprays out water agitating the thrombus and lytic solution while simultaneously aspirating. (Figure 2)

The advantage of the pharmacomechanical thrombolysis procedures, is that they produce rapid clot lysis, yet do not markedly increase bleeding rates, as was observed with just thrombolytic infusion.

The patient in the clinical vignette can be referred to the Oklahoma Heart Institute Deep Vein Thrombosis clinic by calling 918-592-0999. We are available to serve your patients in the evaluation of a patient for pharmacomechanical thrombectomy. ❤️

Dr. Ichinose specializes in interventional cardiology including cardiac catheterization, coronary angioplasty and related interventional procedures such as coronary stents, atherectomy, intravascular ultrasound and peripheral vascular interventional procedures.

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Oklahoma Heart Institute *By Elaine Burkhardt*

LIVING PROOF

With heart disease ranked as Oklahoma's #1 killer, an aging baby boomer population, and obesity on the rise, overwhelming demand for Oklahoma Heart Institute's cardiology services has resulted in significant expansion. New physicians, facilities, and procedures have made Oklahoma Heart Institute (OHI) and Clinics, now 24 years old, the region's largest and most advanced cardiovascular practice.

From prevention and diagnosis to treatment and rehab, a team of 35 specialists in interventional and noninvasive cardiology, electrophysiology, heart failure, and endocrinology sees patients in two physicians' offices in Tulsa. With a commitment to the most advanced technology, they treat complex hospital cases at their flagship heart hospital, Oklahoma Heart Institute, on the campus of Hillcrest Medical Center. They provide the same great hospital care at Hillcrest Hospital South, Hillcrest Hospital Claremore, and Bailey Medical Center, where, if more advanced technology is required, patients are easily transported to OHI in Tulsa.

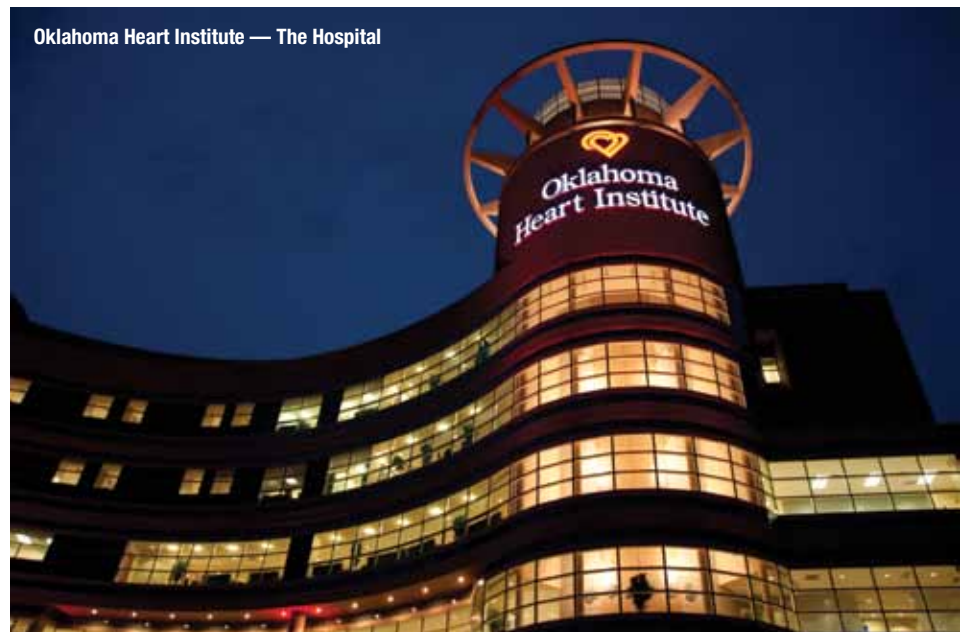
OHI physicians also take award-winning care beyond Tulsa to regional clinics at Bristow, Claremore, Cleveland, Cushing, Fairfax, Henryetta, Miami, Owasso, Pryor, Tahlequah, Vinita, and Wagoner.

In 2012 at the OHI hospital, high demand necessitated doubling the size of the CV ICU unit. Also at the OHI hospital, a new hybrid lab opened. By combining a state-of-the-art cath lab with a complete cardiac surgery operating room, the hybrid lab allows for the treatment of complex and high risk conditions involving the heart and blood vessels that otherwise would not be done.

At the OHI SouthPointe physicians' office building, a new cath lab was opened to expand diagnostic cardiac cath into a convenient, user-friendly, outpatient setting in South Tulsa.

By marrying new facilities with new procedures, OHI's sub-specialized physicians provide patients with complex treatments normally performed only at major universities, and with very successful results.

A revolutionary, new procedure recently was introduced by OHI's invasive team. Transcatheter aortic valve replacement (TAVR) is performed in the new hybrid cath lab on patients who are too



sick to have surgery. With only a small incision, valves are replaced and patients can go home within a few days. Oklahoma Heart has one of the top valve programs in the region, providing excellent outcomes for these high-risk surgery patients.

Another minimally invasive procedure, carotid stenting, is performed by OHI's invasive cardiologists to treat high operative risk patients with blockages of the carotid arteries that supply blood flow to the brain. In addition, many patients elect carotid stenting instead of surgery since there is no scar, and patients often go home the next day.

When surgery is necessary, Oklahoma Heart's surgeons are among the top 50 in the country. In northeastern Oklahoma, the invasive cardiologists at OHI also provide circulatory assist with the Impella systems to perform very high-risk coronary stent procedures in otherwise inoperable patients.

For patients with atrial fibrillation who can't take blood thinners, making them at risk for stroke, the Lariat procedure is now available at Oklahoma Heart, where physicians were the first in the state to perform this cutting-edge procedure.

Also for atrial fibrillation patients who don't

want to take lifelong medications, cryoablation is only available in Northeastern Oklahoma at OHI. For younger people with atrial fibrillation, the innovative use of a coolant for cryoablation is safer and has high success rates. The only cardiology program in the region to use exclusively board certified electrophysiologists to implant ICDs (implantable cardiac defibrillators) is OHI. They also are experts in lead extraction and ventricular tachycardia/PVC ablation/isolation.

Oklahoma Heart Institute is known for its state-of-the-art care, including aquapheresis for diuretic resistant heart failure patients, high success rates for bypass surgery, lifesaving screenings, nationally certified nuclear, echo and CT facilities, and an internationally recognized cardiac MRI program. Continued cardiology and endocrinology expertise provides patients with the latest in preventive care.

Clinical research also remains at the forefront, which allows OHI to provide the latest technology and care to its patients, often five to ten years in advance of it becoming generally available.

All of these things continue to distinguish Oklahoma Heart Institute as the premier provider of cardiology care in Northeastern Oklahoma with the best outcomes in the state. And, as always, their patients are living proof.



Oklahoma Heart Institute — Utica Physicians Office



Oklahoma Heart Institute — SouthPointe Physicians Office



Oklahoma Heart Institute



Services of Oklahoma Heart Institute

Interventional Cardiology

- Cardiac Catheterization
- Coronary Angioplasty
- Multivessel Angioplasty and Stenting
- Atherectomy
- Rotablator Atherectomy
- Thrombolytic Therapy
- Coronary Stents
- Carotid Stenting
- Fractional Flow Reserve
- Intravascular Ultrasound
- Myocardial Biopsy
- Pericardiocentesis
- Peripheral Angioplasty
- Peripheral Stents
- Percutaneous ASD Closures
- Percutaneous PFO Closures
- Impella Circulatory Support
- Therapeutic Hypothermia for Cardiac Arrest Patients
- Transcatheter Aortic Valve Replacement (TAVR)
- Venous Ablation

Noninvasive Cardiology

- CT Angiography
- CT Heart Scan
- Cardiac and Vascular Screening Services

- Nuclear Cardiology
- Echo and Doppler Studies
- Nuclear and Echocardiographic Exercise and Pharmacological Stress Testing
- Retinal Imaging
- Thyroid Ultrasound
- Transesophageal Echocardiography, Arterial Venous Peripheral Vascular Imaging and Doppler Studies
- Peripheral Arterial Doppler and Duplex Imaging
- Cardiovascular Magnetic Resonance Imaging
- External Counterpulsation (ECP) Therapy
- Transcranial Doppler
- Aquapheresis Therapy

Electrophysiology

- Electrophysiology Studies
- Ablation Therapy
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- Pacemaker and Lead Extraction
- Pacemaker Programming
- Pacemaker Monitoring and Clinic
- Implantable Cardioverter Defibrillator (ICD) Replacement
- ICD and Hardware Removal
- ICD Programming
- ICD Monitoring and Clinic

- Holter Monitoring and Interpretation
- 30 Day Cardiac Event Monitors
- Implantation and Interpretation of Long-Term Heart Monitors
- Signal Averaged EKGs and Interpretation
- Head Up Tilt Testing and Interpretation
- Direct Current Cardioversion
- Antiarrhythmic Drug Loading and Monitoring

Metabolic Disorders

- Diabetes
- Thyroid
- Hypertension
- Other Endocrine Problems

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- Advanced Center for Atrial Fibrillation
- Dysrhythmia and Pacer Clinic
- Hypertension Clinic
- Adolescent and Adult Congenital Heart Clinic
- Lipid and Wellness Clinic
- Heart Failure Clinic
- Same Day Appointment Clinic
- Pre-Operative Clinic
- Center for the Treatment of Venous Disease
- Sleep Care

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THE DOCTORS OF OKLAHOMA HEART INSTITUTE

Wayne N. Leimbach, Jr., MD, FACC, FSCAI, FCCP, FAHA



Dr. Leimbach is a specialist in interventional cardiology, including cardiac catheterization, coronary angioplasty, percutaneous closure of PFOs & ASDs and related interventional procedures such as stents, atherectomy, laser, intravascular ultrasound imaging and direct PTCA for acute myocardial infarction. He is Director of the Cardiac and Interventional Laboratories at Oklahoma Heart Institute Hospital and also is past Chief of Cardiology. Dr. Leimbach is Co-Founder of the Lipid and Wellness Clinic at Oklahoma Heart Institute. He is Director of the James D. Harvey Center for Cardiovascular Research at Hillcrest Medical Center, as well as Director of the Oklahoma Heart Research and Education Foundation. He also serves as Clinical Associate Professor of Medicine at the University of Oklahoma College of Medicine – Tulsa. Dr. Leimbach completed a Clinical Cardiology Fellowship and a Research Fellowship at the University of Iowa Hospitals and Clinics. He also completed his Internal Medicine Internship and Residency programs at Iowa, where he was selected Chief Resident in Medicine. He received his medical degree from Northwestern University in Chicago and his Bachelor of Science degree from the University of Michigan.

Board certified in Internal Medicine, Cardiovascular Disease and Interventional Cardiology

Robert C. Sonnenschein, MD, FACC, ASE, RVT, RPVI



Dr. Sonnenschein specializes in echocardiography and noninvasive peripheral vascular imaging. He is past Director of Peripheral Vascular Ultrasound Imaging at Hillcrest Medical Center and Oklahoma Heart Institute and serves as Clinical Associate Professor of Medicine at the University of Oklahoma College of Medicine – Tulsa. He completed his Cardiology Fellowship at the State University of New York Upstate Medical Center in Syracuse, where he also completed his Internal Medicine Internship and Residency programs. Dr. Sonnenschein received his medical degree from Rush Medical College in Chicago and his Bachelor of Arts degree from the University of Pennsylvania.

Board certified in Internal Medicine, Cardiovascular Disease, and Adult Echocardiography Registered Vascular Technologist

Robert E. Lynch, MD, FACC



Dr. Lynch is a specialist trained in noninvasive and invasive cardiology with a special interest in the prevention of cardiovascular disease. He is former Chief of Cardiology at Hillcrest Medical Center, where he also has served as Chief of Medicine and President of the medical staff. Dr. Lynch is former Co-Director of the Lipid and Wellness Clinic at Oklahoma Heart Institute and Director of the Executive Health Program. Dr. Lynch is also a Clinical Assistant Professor at the University of Oklahoma College of Medicine – Tulsa. He completed his Cardiology Fellowship, as well as his Internal Medicine Internship and Residency, at the University of Oklahoma Health Sciences Center. Dr. Lynch received his medical degree from the University of Oklahoma School of Medicine and his Bachelor of Science degree from the University of Tulsa. Before establishing his practice in Tulsa, he served as Chief of Medicine at the U.S. Army Hospital, Bangkok, Thailand.

Board certified in Internal Medicine and Cardiovascular Disease

James J. Nemec, MD, FACC

Dr. Nemec is a specialist in echocardiography, stress echocardiography and nuclear cardiology. He serves as Director of Nuclear Cardiology for Oklahoma Heart Insti-



tute. Dr. Nemec has served as Assistant Professor of Internal Medicine, Division of Cardiology, at Creighton University and as Assistant Professor, Department of Radiology, also at Creighton University. He completed his Clinical Cardiology Fellowship at the Cleveland Clinic Foundation and his Internal Medicine Internship and Residency at Creighton University. Dr. Nemec also completed a year of training in pathology at the University of Missouri, Columbia, MO. He received his medical degree from Creighton University, where he also received his Bachelor of Arts degree.

Board certified in Internal Medicine, Cardiovascular Disease and Nuclear Cardiology

Gregory D. Johnsen, MD, FACC, FSCAI



Dr. Johnsen is an interventional cardiologist with expertise in cardiac catheterization, angioplasty and related interventional procedures, such as stents and atherectomy. He is Director of Cardiac Rehabilitation at Hillcrest Medical Center and Director of the Hillcrest Exercise and Lifestyle Programs. He completed his Clinical Cardiology Fellowship at the University of Oklahoma – Oklahoma City, where he then finished an extra year of dedicated training in interventional cardiology. He completed his Internal Medicine Internship and Residency training at the University of Oklahoma – Oklahoma City, where he also received his medical degree. Dr. Johnsen received his Bachelor of Science degree from Oklahoma State University.

Board certified in Internal Medicine, Cardiovascular Disease and Interventional Cardiology

Alan M. Kaneshige, MD, FACC, FASE



Dr. Kaneshige is a noninvasive cardiologist with expertise in adult echocardiography, stress echocardiography and transesophageal echocardiography. He is Chief of Cardiology at Oklahoma Heart Institute, where he is Director of the Congestive Heart Failure C.A.R.E. Center and the Adolescent and Adult Congenital Heart Clinic. He is past Chief of Cardiology at Hillcrest Medical Center. Dr. Kaneshige completed his Internal Medicine Internship and Residency at Creighton University School of Medicine, where he also received his medical degree. He received a Bachelor of Science in chemistry at Creighton University. Dr. Kaneshige completed his Clinical Cardiology fellowship at Creighton, where he also served as Chief Cardiology Fellow for two years. He completed an additional Cardiac Ultrasound Fellowship at the Mayo Clinic in Rochester. Dr. Kaneshige served as Assistant Professor of Medicine at Creighton University School of Medicine, where he was Director of the Noninvasive Cardiovascular Imaging and Hemodynamic Laboratory.

Board certified in Internal Medicine, Cardiovascular Disease, Adult and Transesophageal Echocardiography

Edward T. Martin, MS, MD, FACC, FACP, FAHA



Dr. Martin is a noninvasive cardiologist with specialty expertise in non-invasive imaging. He is Director of Cardiovascular Magnetic Resonance Imaging at Oklahoma Heart Institute and Hillcrest Medical Center. In addition, he is a Clinical Associate Professor of Medicine at the University of Oklahoma College of Medicine – Tulsa. Dr. Martin has specialty training in Nuclear Medicine, as well as additional training dedicated to Cardiovascular Magnetic Resonance Imaging. He completed his Cardiology Fellowship at the University of Alabama. Dr. Martin's Internal Medicine Internship and Residency training were performed at Temple University Hospital in Philadelphia. He received his medical degree

from the Medical College of Ohio. Dr. Martin completed his Master of Science degree in mechanical engineering at the University of Cincinnati and his Bachelor of Science degree in physics at Xavier University. Dr. Martin is a founding member of the Society of Cardiovascular Magnetic Resonance and is an editorial board member of the Journal of Cardiovascular Magnetic Resonance.

Board certified in Internal Medicine and Cardiovascular Disease

Roger D. Des Prez, MD, FACC



Dr. Des Prez is a noninvasive cardiologist with specialty expertise in echocardiography, nuclear cardiology and cardiac computed tomography. He is Director of Cardiac Computed Tomography at Oklahoma Heart Institute Hospital, at Hillcrest Medical Center and Bailey Medical Center. Dr. Des Prez received his medical degree and Bachelor of Arts degree from Vanderbilt University. He completed his Residency in Internal Medicine and Pediatrics at University Hospital of Cleveland. Dr. Des Prez practiced for six years as an internist with the Indian Health Services in Gallup, NM. He returned to Vanderbilt University as a member of the Internal Medicine Faculty, at which time he also completed his cardiology training.

Board certified in Internal Medicine, Cardiovascular Disease, Echocardiography, Pediatrics and Nuclear Cardiology

Christian S. Hanson, DO, FACE



Dr. Hanson is a specialist in Endocrinology, Metabolism and Hypertension at Oklahoma Heart Institute with expertise in diabetes, lipids and hypertension. He also serves as Clinical Associate Professor of Medicine in the College of Osteopathic Medicine – Oklahoma State University. He completed a Fellowship in Endocrinology, Metabolism and Hypertension at the University of Oklahoma in Oklahoma City. Dr. Hanson's Internal Medicine Residency and Rotating Internship were completed at Tulsa Regional Medical Center. He received his medical degree from Oklahoma State University and his Bachelor of Science degree from Northeastern Oklahoma State University in Tahlequah.

Board certified in Internal Medicine, Endocrinology and Metabolic Diseases

David A. Sandler, MD, FACC, FHRS



Dr. Sandler is a cardiologist with subspecialty expertise in electrophysiology, complex ablation, and atrial fibrillation management. Dr. Sandler is Director of Electrophysiology at Oklahoma Heart Institute Hospital. He completed his Cardiac Electrophysiology Fellowship and his Cardiovascular Medicine Fellowship at New York University Medical Center, New York, NY. Dr. Sandler performed his Internal Medicine Internship and Residency at Mount Sinai Medical Center, New York, NY. He earned his medical degree from Georgetown University School of Medicine in Washington, DC. Dr. Sandler received his Bachelor of Arts degree at the University of Pennsylvania in Philadelphia.

Board certified in Internal Medicine, Cardiovascular Disease and Cardiac Electrophysiology

Raj H. Chandwaney, MD, FACC, FSCAI, FSVM



Dr. Chandwaney is an interventional cardiologist with expertise in cardiac catheterization, coronary angioplasty and related interventional procedures such as coronary stents, atherectomy, intravascular ultrasound and peripheral vascular interventional procedures. Dr. Chandwaney is Director of the Chest Pain Center and Cardiology Telemetry Unit at Oklahoma Heart

Institute Hospital. He completed his Clinical Cardiology Fellowship at Northwestern University Medical School in Chicago, IL., where he also completed an Interventional Cardiology Fellowship. Dr. Chandwaney's Internal Medicine Internship and Residency were performed at Baylor College of Medicine in Houston, TX. He received his medical degree from the University of Illinois at Chicago. Dr. Chandwaney completed his Master of Science degree at the University of Illinois at Urbana-Champaign, where he also received his Bachelor of Science degree.

Board certified in Internal Medicine, Cardiovascular Disease, Interventional Cardiology and Endovascular Medicine

D. Erik Aspenson, MD, FACE, FACP



Dr. Aspenson is a subspecialist in Endocrinology, Metabolism and Hypertension at Oklahoma Heart Institute, with expertise in diabetes, lipids, hypertension and thyroid diseases. He completed a fellowship in Endocrinology at Wilford Hall Medical Center, Lackland AFB, Texas. Dr. Aspenson's Internal Medicine Internship and Residency were completed at David Grant Medical Center, Travis AFB, California where he served as Chief Resident. He received his medical degree from the University of Oklahoma and his Bachelor of Science degree at Oklahoma State University.

Board certified in Internal Medicine, Endocrinology and Metabolic Diseases

Frank J. Gaffney, MD, FACC



Dr. Gaffney is an interventional and noninvasive cardiologist with subspecialty expertise in transesophageal echocardiography, nuclear cardiology, and coronary angiography. He completed his Cardiovascular Medicine Fellowship at Scott & White Memorial Hospital in Temple, Texas. Dr. Gaffney completed his Internal Medicine Internship and Residency at Brooke Army Medical Center in San Antonio. He then remained on staff at Scott & White Memorial Hospital for several years, before entering his Fellowship in Cardiovascular Medicine. Dr. Gaffney earned his medical degree from New York Medical College, Valhalla, New York, and he received his Bachelor of Arts degree at Hofstra University in Hempstead, New York.

Board certified in Internal Medicine, Cardiovascular Disease and Nuclear Cardiology

Eric G. Auerbach, MD, FACC



Dr. Auerbach is a general cardiologist who is particularly interested in preventative cardiology and cardiovascular risk reduction. He completed his cardiology fellowship at the University of Miami/Jackson Memorial Hospital in Miami, FL., following which he obtained additional subspecialty training in cardiovascular MRI, nuclear cardiology, and cardiac CT imaging. His areas of expertise also include echocardiography, transesophageal echocardiography, stress testing, and management of lipid disorders. Dr. Auerbach's Internal Medicine Internship and Residency were performed at the University of Miami/Jackson Memorial Hospital. He earned his medical degree at the University of Miami, Miami, FL., and his Bachelor of Arts degree at Princeton University, Princeton, NJ.

Board certified in Internal Medicine, Cardiovascular Disease, and Nuclear Cardiology

Kelly R. Flesner, MD



Dr. Flesner is a subspecialist in Endocrinology, Metabolism and Hypertension at Oklahoma Heart Institute, with expertise in diabetes, lipids, hypertension and thyroid diseases. Prior to joining Oklahoma Heart, she was at St. John Medical Center in Tulsa. She completed her fellowship in Endocrinology at the University of Texas at Galveston. Her Internal Medicine Internship and Residency were completed at the University of Texas in Houston, where she also received her medical degree. She earned her Bachelor of Science degree at Texas A&M University in College Station, TX.

Board certified in Internal Medicine, Endocrinology, Diabetes and Metabolic Diseases

Robert L. Smith, Jr., MSc, MD, FACC, FSCAI



Dr. Smith specializes in interventional cardiology including cardiac catheterization, coronary angioplasty, and related interventional procedures such as coronary stents, atherectomy, intravascular ultrasound, and peripheral vascular interventional procedures. He completed an Interventional Cardiology Fellowship at the University of Florida College of Medicine in Jacksonville, FL. Dr. Smith performed his Clinical Cardiology Fellowship at Vanderbilt University School of Medicine in Nashville, TN and Tulane University School of Medicine in New Orleans. He received his medical degree from the University of Oklahoma College of Medicine in Oklahoma City and then completed his Internal Medicine Internship and Residency at Emory University School of Medicine in Atlanta, GA. Dr. Smith received his Bachelor of Arts, Bachelor of Science and Master of Science degrees at the University of Oklahoma in Norman, OK.

Board certified in Internal Medicine, Cardiovascular Disease, Interventional Cardiology and Nuclear Cardiology

Craig S. Cameron, MD, FACC, FHRS



Dr. Cameron is a specialist in cardiac electrophysiology, including catheter ablation of arrhythmia, atrial fibrillation management, pacemakers, implantable defibrillators, and cardiac resynchronization devices. He completed his Cardiac Electrophysiology Fellowship and his Cardiovascular Disease Fellowship at Baylor University Medical Center in Dallas, TX. Dr. Cameron's Internship and Internal Medicine Residency were performed at Baylor College of Medicine in Houston. He earned his medical degree from the University of Kansas School of Medicine in Kansas City, KS. Dr. Cameron received his Bachelor of Science degree at Pittsburg State University in Pittsburg, KS.

Board certified in Internal Medicine, Cardiovascular Disease and Cardiac Electrophysiology

Eugene J. Ichinose, MD, FACC



Dr. Ichinose specializes in interventional cardiology including cardiac catheterization, coronary angioplasty and related interventional procedures such as coronary stents, atherectomy, intravascular ultrasound and peripheral vascular interventional procedures. He completed his Interventional and Clinical Cardiology Fellowships and his Internal Medicine Residency at the University of Massachusetts Memorial Health Care Center in Worcester, MA. Dr. Ichinose received his medical degree from Louisiana State University in New Orleans. He earned his Bachelor of Science degree from Texas Christian University in Fort Worth, TX.

Board certified in Internal Medicine, Cardiovascular Disease, Interventional Cardiology and Nuclear Cardiology

Cristin M. Bruns, MD



Dr. Bruns is a specialist in Endocrinology, Diabetes and Metabolism at Oklahoma Heart Institute, with expertise in diabetes, thyroid disease (including thyroid cancer) and polycystic ovary syndrome. She completed her Internal Medicine Internship and Residency and Endocrinology Fellowship at the University of Wisconsin Hospital and Clinics in Madison, WI. Dr. Bruns earned her medical degree from Saint Louis University School of Medicine in St. Louis, MO and her Bachelor of Arts and Bachelor of Science degrees in biology from Truman State University in Kirksville, MO. Prior to joining Oklahoma Heart Institute, Dr. Bruns worked as a clinical endocrinologist at the Dean Clinic in Madison, Wisconsin.

Board certified in Internal Medicine, Endocrinology and Metabolic Diseases

Gregory A. Cogert, MD, FACC, FHRS



Dr. Cogert is a cardiologist who specializes in electrophysiology, including catheter ablation of arrhythmia, as well as the implantation and management of cardiac pacemakers, defibrillators, and cardiac resynchronization devices. He completed his Cardiac Electrophysiology Fellowship at Mayo Clinic in Rochester, MN and his Cardiovascular Fellowship at Cedars-Sinai Medical Center in Los Angeles, CA. Dr. Cogert's Internal Medicine Internship and Residency were completed at UCLA Medical Center in Los Angeles. He earned his medical degree from the University of California in Irvine and received his Bachelor of Science degree in microbiology and molecular genetics from the University of California in Los Angeles.

Board certified in Internal Medicine, Cardiovascular Disease, Echocardiography, Nuclear Medicine and Cardiac Electrophysiology.

John S. Tulloch, MD



Dr. Tulloch is a noninvasive cardiologist with expertise in adult echocardiography, peripheral vascular imaging, nuclear cardiology, cardiac computed tomography and MRI. Dr. Tulloch is Director of the Cardiac and Vascular Ultrasound Department of Hillcrest Medical Center's Cardiovascular Diagnostics. He completed his Cardiovascular Fellowship at the University of Kansas Medical Center in Kansas City, KS. Dr. Tulloch's Internal Medicine Internship and Residency also were completed at the University of Kansas Medical Center. He earned his medical degree from Ross University School of Medicine in New Brunswick, NJ and received his Bachelor of Science degree in biology from Avila University in Kansas City, MO.

Board certified in Internal Medicine, Cardiovascular Disease, Cardiovascular Tomography, and Nuclear Cardiology

Anthony W. Haney, MD, FACC



Dr. Haney is a noninvasive cardiologist with expertise in nuclear cardiology, echocardiography, peripheral vascular imaging and MRI. He also performs diagnostic cardiac catheterization. He completed his Cardiovascular Fellowship at the Medical College of Virginia in Richmond. Dr. Haney's Internal Medicine Internship and Residency were completed at the Mayo Clinic in Scottsdale, AZ. He earned his medical degree from the University of Oklahoma School of Medicine.

Board certified in Internal Medicine, Cardiovascular Disease and Nuclear Cardiology

Ralph J. Duda, Jr., MD, FACP, FACE, FASH



Dr. Duda is a specialist in Endocrinology, Diabetes and Metabolism at Oklahoma Heart Institute, with expertise in diabetes, lipids, hypertension and thyroid diseases. He completed his Fellowship in Endocrinology and Metabolism at the Mayo Graduate School of Medicine, where he also completed his Residency in Internal Medicine. Dr. Duda received his medical degree from Northwestern University School of Medicine in Chicago, IL. He earned his Bachelor of Science degree from Benedictine University in Lisle, IL.

Board certified in Internal Medicine, Endocrinology, Diabetes and Metabolism, Clinical Lipidology, Clinical Hypertension, Clinical Bone Densitometry and Thyroid Ultrasonography

Douglas A. Davies, MD, FACC



Dr. Davies is a hospital-based cardiologist who provides continuity of care for patients admitted to Oklahoma Heart Institute - Hospital. He completed a Clinical Cardiology Fellowship and additional training in nuclear cardiology at the Medical College of Virginia, where he also completed his Internal Medicine and Residency programs. Dr. Davies received his medical degree from Johns Hopkins University School of Medicine in Baltimore.

Board Certified in Internal Medicine, Cardiovascular Disease, Nuclear Cardiology and Cardiovascular Computed Tomography Angiography

Kevin L. Lewis, MD



Dr. Lewis is a sleep specialist and a leading researcher and expert on the diagnosis and treatment of sleep disorders. He is Director of Sleep Care Services for Oklahoma Heart Institute, as well as Medical Director of Oklahoma Heart Institute Sleep Care of Hillcrest Medical Center. Dr. Lewis completed Fellowship training in Sleep Care, Pulmonary, and Critical Care at the University of Missouri Hospitals and Clinics in Columbia and the University of Kentucky Medical Center in Lexington. He completed his Internal Medicine Residency programs at the University of Nebraska Medical Center in Omaha and the Oklahoma University College of Medicine in Tulsa. Dr. Lewis earned his medical degree from the University of Texas Health Science Center in San Antonio. *Board certified in Internal Medicine, Pulmonary Diseases, Critical Care and Sleep Medicine.*

Neil Agrawal, MD



Dr. Agrawal is a noninvasive cardiology specialist with expertise in adult echocardiography, nuclear cardiology, cardiac computed tomography and MRI. He completed his Cardiovascular Fellowship at the University of Vermont. Dr. Agrawal's Internal Medicine Internship and Residency were completed at the University of Louisville, and he earned his medical degree from St. George's University in Granada, West Indies. Dr. Agrawal completed his Bachelor of Science degree in biochemistry at the University of Texas at Austin. *Board certified in Internal Medicine*

Kamran I. Muhammad, MD, FACC, FSCAI



Dr. Muhammad is a subspecialist in interventional cardiology with expertise in cardiac catheterization, coronary intervention (including angioplasty, stent placement, atherectomy, intravascular ultrasound), peripheral vascular intervention (including carotid intervention) as well as interventional therapies for structural heart disease, including PFO, ASD and valvular disease. In addition to his clinical experience, Dr. Muhammad has authored many peer-reviewed articles and textbook chapters on important cardiology topics.

Dr. Muhammad completed his Interventional Cardiology Fellowship at the Cleveland Clinic in Cleveland, Ohio, which included an additional year of dedicated training in peripheral vascular and structural cardiac intervention. His Clinical Cardiology Fellowship was also conducted at the Cleveland Clinic. Dr. Muhammad completed his Internal Medicine Internship and Residency at Yale University in New Haven, Connecticut, where he was selected and served as Chief Resident. He earned his medical degree from the University of Massachusetts Medical School in Worcester, Massachusetts. Dr. Muhammad earned his Bachelor of Science degree in computer science from the University of Massachusetts in Amherst, Massachusetts. *Board certified in Internal Medicine, Cardiovascular Disease, Nuclear Cardiology and Interventional Cardiology*

Morakod Lim, MD



Dr. Lim is an interventional and noninvasive cardiologist with subspecialty expertise in cardiac catheterization, angioplasty, stents and atherectomy, as well as echocardiography, nuclear cardiology and coronary angiography. He completed his Interventional Cardiology Fellowship at the University of Medicine and Dentistry of New Jersey/Robert Wood Johnson Medical School in New Brunswick, NJ. His Clinical Cardiology Fellowship was conducted at the Albert Einstein College of Medicine in the Bronx, NY.

Dr. Lim completed his Internal Medicine Internship and Residency at Loma Linda University in Loma Linda, CA. He earned his medical degree from the Stony Brook School of Medicine in Stony Brook, NY. Dr. Lim received his Bachelor of Science degree in physics at New York University in New York, NY. *Board certified in Internal Medicine, Cardiovascular Disease, Echocardiography, Nuclear Cardiology and Interventional Cardiology*

Arash Karnama, DO, FACC



Dr. Karnama is a specialist in interventional cardiology, including cardiac catheterization, coronary intervention, nuclear cardiology, echocardiography (TEE/TTE), cardioversion, peripheral angiography, peripheral intervention, carotid angiography, intravascular ultrasound, atherectomy, and PTCA/stenting for acute myocardial infarction.

Dr. Karnama completed his Interventional and Clinical Cardiology Fellowships at Oklahoma State University Medical Center and his Internal Medicine Internship and Residency at the Penn State Milton S. Hershey Medical Center in Hershey, PA. Dr. Karnama received his medical degree from Des Moines University in Des Moines, IA and his Bachelor of Arts degree from the University of Iowa in Iowa City.

Board certified in Internal Medicine, Interventional Cardiology, Cardiovascular Disease, Nuclear Cardiology, and Cardiovascular Computed Tomography

Victor Y. Cheng, MD, FACC, FSCCT



Dr. Cheng joins Oklahoma Heart Institute after serving as cardiology faculty at Cedars-Sinai Medical Center and assistant professor at the University of California in Los Angeles for the past four years. He is a specialist in noninvasive heart and vascular imaging, particularly in cardiac computed tomography (CT), a topic on which he has published numerous original research publications addressing quality, clinical use, and novel applications.

Dr. Cheng's training included a Clinical Cardiology Fellowship and Advanced Cardiac Imaging Fellowship at Cedars-Sinai Medical Center, and an Internal Medicine Internship and Residency at the University of California in San Francisco. Dr. Cheng received his medical degree from Northwestern University in Chicago, IL and his Bachelor of Science degree from Northwestern University in Evanston, IL.

Board certified in Internal Medicine, Cardiovascular Disease, Nuclear Cardiology, Echocardiography and Cardiovascular Computed Tomography

Jana R. Loveless, MD



Dr. Loveless is a sleep specialist, with expertise in the diagnosis and treatment of sleep disorders. Prior to joining Oklahoma Heart Institute, Dr. Loveless was with Nocturna of Tulsa, Warren Clinic and Springer Clinic.

She completed her Internal Medicine Residency program at the University of Oklahoma, Tulsa, where she was Chief Resident. She also earned her medical degree from the University of Oklahoma, Tulsa.

Dr. Loveless completed graduate studies at Texas Tech University, and she earned her Bachelor of Arts degree at Davidson College in Davidson, North Carolina.

Board Certified in Internal Medicine and Sleep Medicine

Mathew B. Good, DO



Dr. Good is an invasive/noninvasive cardiology specialist with expertise in adult echocardiography, nuclear cardiology, cardiac computed tomography, peripheral vascular ultrasound and MRI.

He completed his Cardiovascular Fellowship at the University of Kansas Medical Center in Kansas City, KS, where he also completed his Internal Medicine Internship and Residency.

Dr. Good received his medical degree from the Oklahoma State University Center for Health and Sciences in Tulsa and his Bachelor of Arts degree from the University of Colorado in Boulder.

Board certified in Internal Medicine and Cardiovascular Computed Tomography

Stanley K. Zimmerman, MD



Dr. Zimmerman is a specialist in interventional cardiology, including cardiac catheterization, coronary angioplasty, and related interventional procedures such as coronary stents, atherectomy, vascular ultrasound and peripheral vascular interventional procedures.

He completed his Interventional and Cardiovascular Fellowships at the University of Kansas Medical Center in Kansas City, KS, as well as his Internal Medicine Internship and Residency. In addition, Dr. Zimmerman received his medical degree from the University of Kansas Medical Center and his Bachelor of Arts degree from the University of Kansas in Lawrence.

Board certified in Internal Medicine, Cardiovascular Disease and Interventional Cardiology

Stephen C. Dobratz, MD, FACC



Dr. Dobratz specializes in diagnostic and interventional cardiology, including cardiac catheterization, peripheral angiography, pacemakers and defibrillators, cardioversion, cardiac nuclear studies, cardiac computed tomography, transesophageal echo and echocardiograms.

He completed his Fellowship in Cardiology at Allegheny General Hospital in Pittsburgh, Pennsylvania. Dr. Dobratz completed his Internal Medicine Internship and Residency at the University of Arizona in Tucson. He earned his medical degree at Eastern Virginia Medical School in Norfolk and his undergraduate degree at James Madison University in Harrisonburg, Virginia.

Board certified in Cardiovascular Disease

Paul Kempe, MD

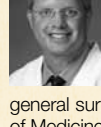


Dr. Kempe is a Cardiovascular Thoracic Surgeon at Oklahoma Heart Institute.

His completed his Internal Medicine Internship and Residency at Richland Memorial Hospital in Columbia, South Carolina. Dr. Kempe earned his medical degree at the University of Texas Southwestern Medical School in Dallas. He received his undergraduate degrees in Chemistry at Abilene Christian University.

Board certified in Thoracic Surgery

Michael Phillips, MD, FACC, FACS



Dr. Phillips is a Cardiovascular Thoracic Surgeon at Oklahoma Heart Institute. He completed his fellowship at Mid America Heart Institute in Kansas City, MO and his general surgery residency at the Mayo Graduate School of Medicine. He earned his medical degree from the University of Missouri. Dr. Phillips received his undergraduate degrees in Biology and Chemistry at William Jewell College in Liberty, MO.

Board certified by in Thoracic and General Surgery

Reducing Stroke in Atrial Fibrillation

By Greg Cogert, MD, FACC, FHRS

WHAT IS ATRIAL FIBRILLATION?

Atrial fibrillation (AF) is the most common heart rhythm problem in America, with over 4 million people who carry the diagnosis of AF and many more yet to be diagnosed. Normally, every beat of the heart is initiated by the upper chamber (atrium) contracting. This atrial impulse sets the heart rate and facilitates the flow of blood in the heart. With atrial fibrillation, there is continuous chaotic electrical activity in the atrium with no atrial contraction and no atrial control of the heart rate (Figure 1). The loss of normal atrial blood flow can result in clotting of blood in the heart. The loss of heart rate control can result in symptoms of fatigue, weakness, loss of exercise tolerance, and potentially a dangerously fast or slow heart rate.

Atrial fibrillation can result in a dramatic reduction in quality of life, physical condition, mental health, and social functioning, as well as cause congestive heart failure, stroke, dementia, and death.

WHO IS AT RISK FOR ATRIAL FIBRILLATION?

There is an increasing incidence with age and it is estimated that 25% of adults over 40 will develop AF during their lifetime. In addition to age, common risk factors for AF include high blood pressure, obesity, and obstructive sleep apnea. Patients with any chronic medical problem are also at an increased risk for AF, especially problems of the heart, lungs, kidney, thyroid, and diabetes.

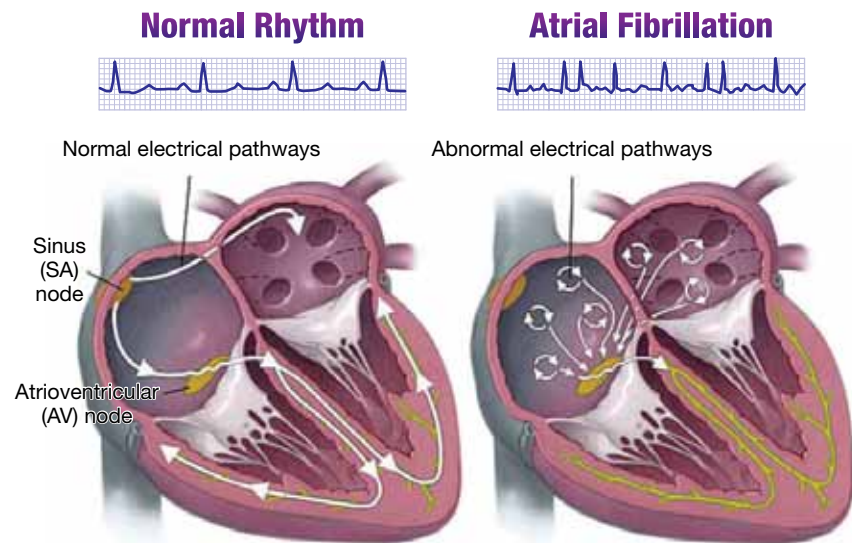
HOW IS ATRIAL FIBRILLATION TREATED?

The first step in the treatment of AF is to evaluate the risk of stroke and initiate a treatment plan to minimize that risk. There are 5 classic risk factors for stroke in AF. They are the "CHADS risk factors"

- C = Congestive Heart Failure**
- H= Hypertension**
- A= Age over 75 years old**
- D= Diabetes**
- S= prior Stroke or TIA**

The risk for stroke in AF with none of these risk factors is under 2%, whereas, in the presence of all 5, the annual stroke rate approaches 20%. Stroke risk is also increased in women, patients over 65 years old, and the presence of vascular disease.

Figure 1



Atrial fibrillation can result in a dramatic reduction in quality of life, physical condition, mental health, and social functioning, as well as cause congestive heart failure, stroke, dementia, and death.

There are currently four approved anticoagulant medications (blood thinners) used to minimize stroke in AF:

Coumadin (warfarin): Blocks the liver's production of clotting factors. Warfarin was the only option prior to 2010. Warfarin is a once daily medication that is affordable. An individual's dose is highly variable and frequent blood tests are required to confirm the correct dosing. Negatives include multiple food and drug interactions resulting in frequent dose changes and blood tests.

Pradaxa (dabigatran): Direct Thrombin Inhibitor. Approved by the FDA in October, 2010. In a large research trial it was found to be superior to warfarin. If kidney function is stable, the dosing is reliable and no blood tests are required. There are significantly less food and drug interactions than with warfarin. It is more expensive and there are less long-term safety data than warfarin. Negatives include the cost, twice daily dosing, and >10% of patients do not tolerate due to stomach irritation.

Xarelto (rivaroxaban): Clotting factor (Xa) inhibitor. Approved for treatment of AF in November, 2011. Similar to dabigatran with stable dosing and minimal food and drug interactions negating the need for frequent blood tests in patients with stable kidney function. Cost is similar to dabigatran. In the large research trial that led to approval, its effectiveness was found to be equivalent to warfarin (as opposed to superiority seen with dabigatran). Advantages include once daily dosing and an improved side effect profile.

Eliquis (apixaban): Clotting factor (Xa) inhibitor. Approved for treatment of AF in December, 2012. Similar to rivaroxaban with stable dosing and minimal food and drug interactions negating the need for frequent blood tests in patients with stable kidney function. In the large research trials that led to approval, its safety and effectiveness was found to be superior to warfarin with a bleeding profile comparable to aspirin. Disadvantages include twice daily dosing.

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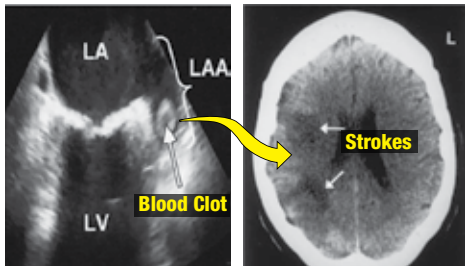
BLOOD THINNERS FOR EVERYONE?

In all but the lowest risk for stroke patients (CHADS₂), anticoagulant medications have shown clear superiority in reducing the risk for stroke in AF. This conclusion has been validated in long-term research studies of over 100,000 patients. Importantly, the risk for stroke does not follow the quantity of AF a patient has, and even patients who spend the majority of time in normal rhythm warrant the same treatment as those in continuous atrial fibrillation.

There is, however, a subgroup of patients in whom the risk of bleeding conferred by taking blood thinners outweighs their benefits. These are patients who are at a high risk for bleeding, many of whom have had previous life threatening bleeding in the head or have required blood transfusion. In this subgroup of patients who cannot safely take blood thinners, we consider an invasive approach to stroke reduction.

Figure 2

Atrial Fibrillation Causes Stroke



Over 90% of strokes in AF are felt to originate from the left atrial appendage (LAA) (Figure 2). For years cardiac surgeons have sought to mitigate stroke risk in patients undergoing cardiac surgery by removing the LAA. The **AtriClip** was approved in 2010 for surgical closure of the LAA to prevent stroke in AF. Less invasive procedures to exclude the LAA from the circulation without heart surgery are currently being developed.

The best-studied implantable device to occlude the LAA is the **Watchman device** (Figure 3). The Watchman is a plug inserted from within the heart to occlude the LAA without requiring heart surgery.

This device remains under active investigation, but is yet to be approved by the FDA.

Recently the FDA has approved the **LARIAT** suture delivery device to close the LAA. The LARIAT procedure is performed under general anesthesia. The LARIAT is a pre-tied suture (figure 4) that is delivered from one puncture in the right groin and another below the rib cage. Once the suture is advanced to the base of the LAA, the loop is tightened down permanently, sealing the LAA off from the rest of the heart. Once tied off, the appendage shrivels into scar tissue. A successful LARIAT eliminates the main source of stroke in AF, while avoiding the potentially serious bleeding risks of blood thinners, as well as the need for heart surgery. In the trial that led to its approval, the LARIAT procedure took on average 45 minutes to complete and had a 95% success rate at 3 months of follow up. Although this is a new technology lacking long-term results, surgical research has not found any negative effects from removing the LAA. While the preponderance of research data currently supports taking lifelong blood thinners, the hope is that future studies will show that procedures like LARIAT will eliminate the need for blood thinners.

SUMMARY

Atrial fibrillation is the most common heart rhythm problem in America. In addition to its known associations with decreased quality of life, congestive heart failure, dementia, and death, AF confers a 5x increased risk for stroke. The first step in the management of AF is to minimize stroke risk. This is done primarily by taking one of the four approved blood thinners: Coumadin (warfarin), Pradaxa (dabigatran), Xarelto (rivaroxiban), or Eliquis (apixaban). In patients who are unable to tolerate blood thinners due to bleeding risk, the left atrial appendage is targeted as the culprit for over 90% of strokes in AF. Cardiac surgery and LARIAT suture delivery are the two approved methods to seal off the LAA from the rest of the heart. ❤️

Dr. Cogert is a cardiologist who specializes in electrophysiology, including catheter ablation of arrhythmia, as well as the implantation and management of cardiac pacemakers, defibrillators, and cardiac resynchronization devices.

Figure 3

Wathman LAA Occluder

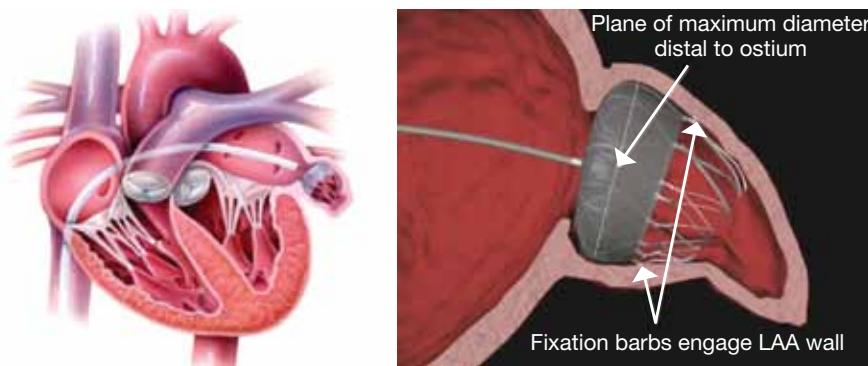


Figure 4

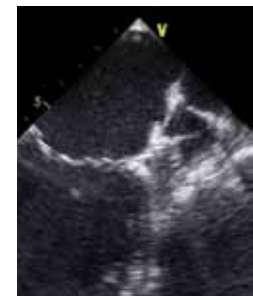
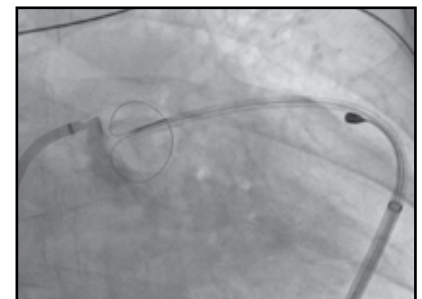
LARIAT Suture Delivery Device



LAA Before



LAA After





Oklahoma Heart Institute Sleep Care *of Hillcrest Medical Center*



Oklahoma Heart Institute now offers comprehensive sleep care at our new diagnostic facility located in Columbia Plaza:

**2651 E. 21st Street, Suite 400
Tulsa, OK 74114**

Phone: 918.747.5337 (918.74 SLEEP)

Toll Free: 855.437.5337 (855.43 SLEEP)

Fax: 918.728.3307

The facility features 6 beds, and operates most nights per week.

What to expect during a sleep study:

- A warm welcome by highly qualified technicians
- An informal orientation during which the sleep study process will be explained, and you will have an opportunity to ask questions
- A comfortable, stylish and luxurious bedroom featuring:
 - Queen sized, luxury bed with pillows
 - 300+ thread count sheets
- A continental breakfast in the morning

Oklahoma Heart Institute Services in South Tulsa

By Robert Smith, Jr., MSc, MD, FACC, FSCAI





Figure 1: The OHI Vein Clinic has been treating patients with venous disease since 2009. In 2012, we opened our new, state-of-the-art, dedicated venous procedure suite. This room is designed to maximize patient comfort and to facilitate venous catheter ablation, microsurgical phlebectomy, and sclerotherapy in a safe, functional environment.

In September, 2011, Hillcrest HealthCare System (HHS) completed the purchase of SouthCrest Hospital in Tulsa, Okla., and Claremore Regional Hospital in Claremore, Okla. The transaction included the assets and operations of the 180-bed SouthCrest Hospital, the 89-bed Claremore Regional Hospital, and more than 70 primary care physicians, specialists, and mid-level providers. These exciting new acquisitions complement the already well-established South Tulsa operation of Oklahoma Heart Institute, which has returned to Hillcrest Hospital South (formerly SouthCrest) with a commitment to provide the highest quality cardiovascular services in the region and to have an impact on the cardiovascular health of South Tulsa and beyond.

With physicians' offices just across from Hillcrest Hospital South, Oklahoma Heart Institute has been providing quality cardiovascular services to South Tulsans for over 10 years. Our facility at 9228 South Mingo Road is the primary office for many of our interventional cardiologists, noninvasive cardiologists, cardiac electrophysiologists, endocrinologists, and sleep care specialists.

OHI Services offered in the SouthPointe Tulsa office are extensive and include outpatient cardiac catheterization, cardiovascular MRI, vascular MRA, exercise stress testing, nuclear stress testing, echocardiography, stress echocardiography, Holter monitoring, outpatient telemetry monitoring, carotid ultrasound, peripheral arterial ultrasound, thyroid ultrasound, retinal imaging, same-day pre-operative clinic consultation, critical limb ischemia consultation, acute DVT consultation, vein clinic consultation, sleep medicine consultation, endocrine consultation, cardiac electrophysiology consultation, and cardiology (general and interventional) consultation.

Additionally, our brand new OHI vein clinic suite, where OHI vein specialists perform venous catheter ablation, microsurgical phlebectomy, and sclerotherapy, is located in the SouthPointe Tulsa facility (Figure 1).

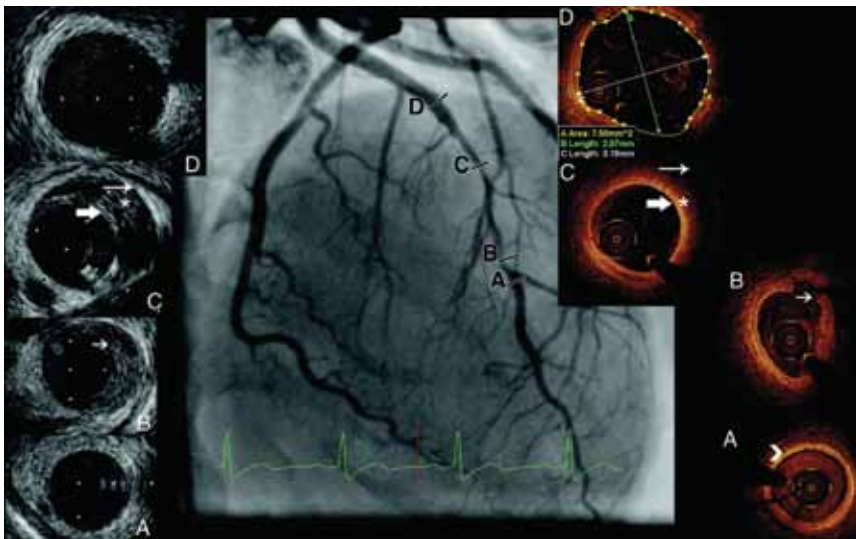
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Figure 2: In the last fifteen months, Oklahoma Heart Institute's parent company, Ardent Health Services, has invested in three new Philips FD20 Allura Cardiac Catheterization labs in our South Tulsa facilities. Two of these labs are in use in Hillcrest Hospital South. The third recently opened in our office at 9228 South Mingo Road and is used for diagnostic outpatient coronary angiography. We will soon be adding an additional new cath lab at Hillcrest Hospital South.

Figure 3

Coronary Optical Coherence Tomography (OCT)



Coronary Optical coherence tomography (OCT) has emerged as a technological breakthrough in the field of intracoronary imaging by providing high-resolution in vivo images with near histological detail. It provides many advantages over the more traditional coronary intravascular ultrasound imaging (IVUS). A, Distal normal left anterior descending (LAD) artery. The intact normal arterial wall was shown well by both modalities (arrow on optical coherence tomography [OCT] image). B, Distal dissection. Intravascular ultrasound (IVUS) images showing intramural hematoma and luminal compression, but it was unable to demonstrate the intimal flap. OCT showed clearly the distal exit point of the dissection with the intimal flap and communication between the intramural hematoma and true lumen (arrow). C, Mid-LAD dissection. A large crescent-shaped eccentric hematoma (*). IVUS showed well the inner lumen (thick arrow) and external vessel reference (thin arrow); OCT showed the hematoma compression and demonstrated the integrity of an otherwise disease-free intima but did not reveal the vessel reference diameter as clearly as IVUS. D, Normal proximal LAD. OCT measurement of reference lumen area and diameter for stent sizing are shown.

Circulation: Cardiovascular Interventions April 2011 vol. 4 no. 2

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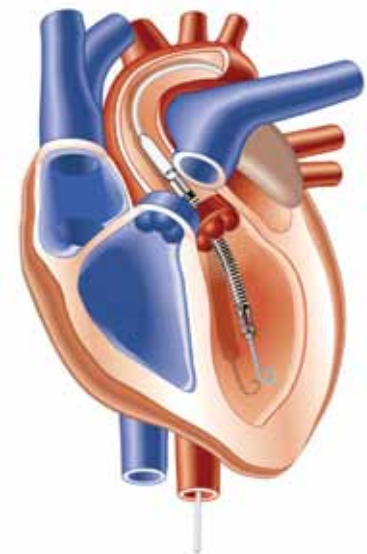
We are also excited about the expansion of cardiovascular services underway at Hillcrest Hospital South. These include installation of two new state-of-the-art cath labs (Figure 2), procurement of new coronary Optical Coherence Tomography (coronary OCT) technology (Figure 3), procurement of the Impella circulatory assist device (Figure 4), full accreditation by the SCPC as a dedicated chest pain center, opening of a new outpatient sleep lab, and the launching of a successful new carotid stenting program.

In the coming months, we will see the installation of advanced cardiac electrophysiology mapping equipment, launching of a new OHI CT angiography program, launching of a dedicated Hillcrest South cardiac electrophysiology program, and the development of a top notch cardiovascular surgery program based in South Tulsa.

Of course, these new services will complement the array of cardiovascular services already offered at Hillcrest South. These are extensive and in-

Figure 4

Impella 2.5 Cardiac Assist Device in Left Ventricle



The Impella device is a tiny pump that is inserted with a catheter through the groin. It can be used temporarily to help patients tolerate procedures such as angioplasty and stenting by relieving the heart's pumping function and providing the time needed to perform life-saving procedures.

Image courtesy of ABIOMED Inc., Danvers, Massachusetts

For over 25 years, OHI has been providing the highest quality care to patients in eastern Oklahoma and the surrounding area. We will now ensure that South Tulsans can receive the best cardiovascular care available close to home.

clude: diagnostic coronary angiography, coronary angioplasty and stenting, coronary rotator atherectomy, coronary fractional flow reserve (FFR), coronary intravascular ultrasound (IVUS), diagnostic peripheral angiography, complex peripheral arterial interventions, peripheral arterial atherectomy, inferior vena cava filter placement, therapeutic hypothermia, internal cardiac defibrillator (ICD) implantation, pacemaker implantation, ablation of supraventricular tachycardia and atrial flutter, cardioversion of atrial arrhythmias, transesophageal and 2D echocardiography, and nuclear stress testing.

For nearly 25 years, OHI has been providing the highest quality cardiovascular care to patients in eastern Oklahoma and the surrounding area. Since 2004, Hillcrest Healthcare System's parent company, Ardent Health Services, has invested an estimated 300 million dollars in Hillcrest's facilities, equipment and people, and in doing so has demonstrated a commitment to Tulsa and the surrounding region.

At OHI, we are excited for the opportunity to partner with Hillcrest Hospital South in order to optimize patient service and quality in South Tulsa, while developing a superior, full service, cardiovascular service line. In doing so, we will ensure that South Tulsans can receive the best cardiovascular care available. while remaining closer to their homes and families. ❤️

Dr. Smith specializes in interventional cardiology including cardiac catheterization, coronary angioplasty, and related interventional procedures such as coronary stents, atherectomy, intravascular ultrasound, and peripheral vascular interventional procedures.

OHI SouthPointe Tulsa Clinical Services	OHI Services at Hillcrest Hospital South
Outpatient diagnostic coronary angiography	On-site consultation for all cardiac sub-specialties
Cardiovascular MRI and vascular MRA	Diagnostic coronary angiography
Same-day pre-operative clinic consultation	Coronary angioplasty and stenting
Critical limb ischemia consultation	Coronary rotator atherectomy
Acute DVT consultation	Coronary fractional flow reserve (FFR)
Sleep medicine consultation	Coronary intravascular ultrasound (IVUS)
Endocrine consultation	Coronary Optical Coherence Tomography (OCT)
Cardiac electrophysiology consultation	Impella circulatory assist device
General cardiology consultation	Therapeutic hypothermia (post cardiac arrest)
Interventional cardiology consultation	Carotid artery stenting
Vein clinic consultation	Diagnostic peripheral angiography
Venous catheter ablation	Complex peripheral arterial interventions
Venous microsurgical phlebectomy	Peripheral arterial atherectomy
Venous sclerotherapy	Inferior vena cava filter placement
Exercise and nuclear stress testing	Internal cardiac defibrillator (ICD) implantation
2D echocardiography	Pacemaker implantation
Stress echocardiography	Ablation of supraventricular tachycardia and atrial flutter
Carotid ultrasound	Complex ablations (atrial fibrillation, ventricular tachycardia)*
Peripheral arterial ultrasound	Cardioversion of atrial arrhythmias
Thyroid ultrasound	Transesophageal and 2D echocardiography
Retinal imaging	Exercise and nuclear and stress testing
Holter monitoring	Coronary and Vascular CT angiography
Outpatient telemetry monitoring	Cardiovascular surgery (CABG, valve, surgical Maze)*
Pacemaker and ICD management (device clinic)	Outpatient sleep lab
*Coming soon	

Celebrate Spring

Kick off your boots and strap on your sandals. Sunny spring days are here again, and with them come delicious fresh fruits and vegetables.

Pile your plate high with rainbows of heart healthy foods. The more colorful, the better!

ASPARAGUS WITH GINGER-ORANGE VINAIGRETTE

Serves 4

This vegetarian side dish hits the spot all year round. Grill the asparagus in the summer or roast it in the winter, if you like.

- 1 tablespoon finely chopped fresh ginger**
- 1/2 teaspoon finely grated orange peel**
- 2 tablespoons orange juice**
- 2 teaspoons white wine vinegar**
- 1/4 teaspoon soy sauce**
- 1/4 teaspoon salt**
- 1/4 teaspoon freshly cracked black pepper**
- 3 tablespoons extra virgin olive oil**
- 1 pound asparagus, washed, tough ends snapped off**

Whisk together ginger, orange peel, orange juice, vinegar, soy sauce, salt and pepper. Slowly whisk in olive oil until an emulsion forms. Set aside.

Steam asparagus until just tender, about 5 minutes. Drizzle vinaigrette over warm asparagus and serve.



RAW BERRY CRISP

Serves 8

Rich nuts and sweet dates make a tasty topping for mixed berries in this no-cook version of berry crisp.

- 6 cups mixed berries, such as blackberries, blueberries, raspberries and sliced strawberries**
- 1 tablespoon pure maple syrup, more or less to taste depending on sweetness of berries**
- 1 cup raw pecans**
- 1/2 cup raw walnuts**
- 1/2 cup pitted dates, roughly chopped**
- 1/2 teaspoon ground cinnamon**

In a (7- x 11-inch) dish, toss berries with maple syrup. Put pecans, walnuts, dates and cinnamon into a food processor and pulse until coarsely ground. Scatter nut mixture over berries and serve immediately, or chill until ready to serve.

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With angioplasty, lifesaving stents, ablation, ASD & PFO closures.

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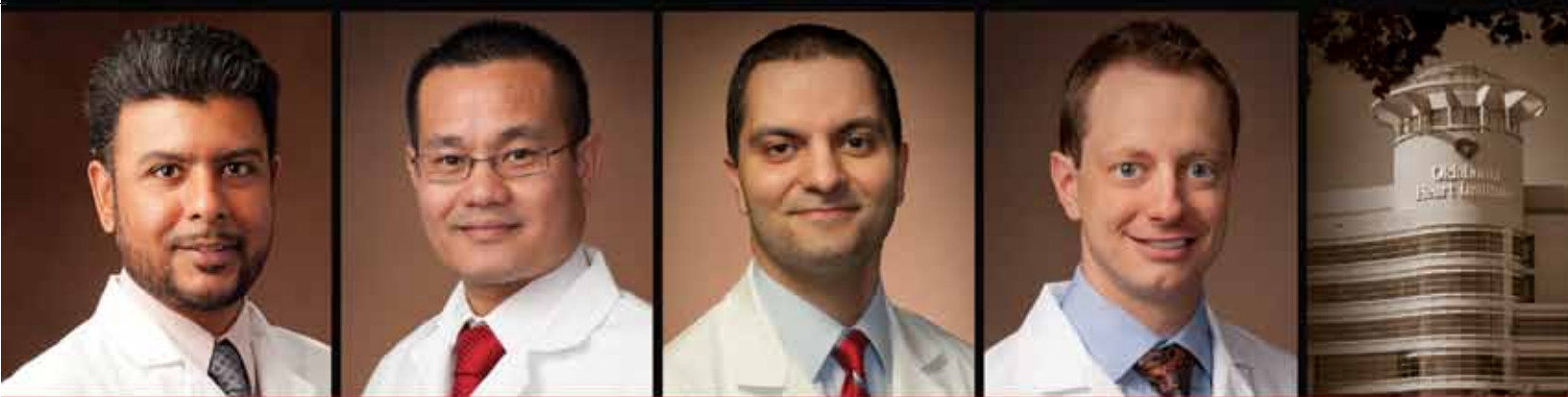
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It's a new day in cardiology because of what the doctors at Oklahoma Heart Institute are bringing you. We treat every kind of heart problem - even the most difficult ones. Day and night, our special training and team approach gives people like you great results. So you can live well. Isn't that what you want?



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