Duke Children's
HOSPITAL & HEALTH CENTER

Duke Children's Heart Program:
A guide to our services

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Jennifer S. Li, MD
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* Specialized training in cardiac MRI

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CATHETERIZATION
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Kevin D. Hill, MD, MS
John F. Rhodes Jr., MD

ELECTROPHYSIOLOGY AND DEVICE MANAGEMENT
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PEDIATRIC HEART FAILURE MANAGEMENT AND HEART TRANSPLANT
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PEDIATRIC AND CONGENITAL HEART SURGERY
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Andrew J. Lodge, MD

PEDIATRIC CARDIAC ANESTHESIOLOGY
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Michelle Taylor, PNP
Mark D. Weber, RN, MSN, PCCNP

OUTPATIENT PROVIDERS
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Mary Gooch, PCT
Cathy Robinson, NC
Lisa Thigpen, NC

For details about our faculty members—including information about their clinical specialties, training, and office locations and phone numbers—visit **dukehealth.org/physicians**.

The mission of Duke Children's Heart Program is to deliver world-class care to children and adults* with congenital heart disease, and children with acquired heart disease.

Our team provides the full range of inpatient and outpatient diagnostic, treatment, and follow-up services for cardiovascular diseases that affect the fetus, infant, child, adolescent, and young adult.

Team members are committed to delivering comprehensive evidence-based care, conducting leading-edge research, and educating tomorrow's pediatric cardiovascular specialists—commitment that has built an eminent program consistently named among the nation's best by *U.S.News & World Report*.

From common problems such as murmurs, syncope, and palpitations to the most complex forms of congenital heart disease, the Duke Children's cardiac team delivers highly skilled, family-centered care at community practices and hospitals throughout North Carolina.

HIGHLIGHTS INCLUDE:

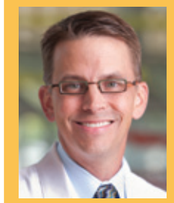
- **Extensive experience treating complex structural heart disease**, including the use of innovative non-surgical procedures to treat many patients
- **Surgical outcomes** that are among the world's best
- **A thriving heart transplant program** that is restoring the lives of patients with conditions who have exhausted their other therapeutic options
- **Access to all of the resources** of a major academic medical center

Clinical research conducted by our faculty, nursing staff, and fellows—often in collaboration with the prestigious Duke Clinical Research Institute—advances cardiac care by translating evidence-based advances in drug therapies and technologies to the bedside.

To learn more about the Duke Children's Heart Program, visit **dukehealth.org/childrensheart** or dial the Duke Consultation and Referral Center's dedicated toll-free physician line at **800-MED-DUKE (633-3853)**.

It is our privilege and pleasure to care for the patients of our partner physicians, and we are happy to share this overview of our offerings.


Li


Rhodes


Jaquiss

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Chief, Pediatric Cardiology

John F. Rhodes Jr., MD
Director, Children's Heart Program and Medical Director, Pediatric Congenital Catheterization Lab

Robert D.B. "Jake" Jaquiss, MD
Chief, Pediatric Cardiothoracic Surgery

* We work closely with the acclaimed Duke Heart Center to seamlessly transition the care of patients as they reach adulthood.

Services

Visit **dukehealth.org/childrensheart** to learn more about our services

Cardiac Imaging

Among the Southeast's leading programs of its kind

The Duke Children's Heart Program's Diagnostic Imaging Program employs an array of standard and cutting-edge technologies that include:

- **Echocardiography**—Including transthoracic, transesophageal, fetal, and intracardiac echo; 3-D anatomic imaging; myocardial mechanics and dyssynchrony analysis
- **Telemedicine**—Real-time guidance and interpretation of transthoracic studies performed at community hospitals throughout North Carolina
- **Magnetic resonance imaging (MRI)**—Performed by pediatric cardiologists with advanced cardiac MRI training, in conjunction with the Duke Cardiac Magnetic Resonance Center, an international leader in cardiac MRI
- **Computed tomography (CT)**—Performed with sophisticated multi-detector CT technology by the Duke Division of Pediatric Radiology, a world leader in x-ray dose reduction for CT imaging

Sedation or anesthesia, administered by the Pediatric Cardiac Anesthesiology team, is available to children unable to cooperate for imaging studies.

Each year Duke performs about **10,000** transthoracic echocardiograms in patients from infants to adults, **220** pediatric and adult congenital cardiac MRIs, and approximately **1,100** fetal diagnostic echo studies.

Exercise Testing

One of the region's only dedicated pediatric exercise testing facilities, performing 300+ studies a year

The Duke Children's Pediatric Exercise Physiology Laboratory (PEPL) is a state-of-the-art facility that provides cardiopulmonary exercise and cardiovascular stress testing for diagnosing and managing exercise-related cardiac and pulmonary concerns such as chest pain, shortness of breath, or cardiac rhythm disturbances.

The PEPL also offers testing for children with congenital and acquired abnormalities that reduce exercise tolerance and/or cause exercise-related symptoms, as well as bike and treadmill ergometry for adults with congenital abnormalities of the heart or lung.

Staffed by pediatric cardiologists and pulmonologists, the lab performs more than 300 tests a year—and is committed to delivering the highest-quality information to pediatric specialists, primary care physicians, and other clinicians. Services include:

- Cardiovascular stress testing
- Cardiopulmonary stress testing (with and without spirometry)
- Indirect calorimetry
- Six-minute walk tests
- Exercise-induced bronchospasm tests
- Stress echocardiography

Catheterization

High volumes, the complete range of diagnostic and therapeutic procedures

With more than 900 cardiac catheterizations annually, Duke has North Carolina's highest-volume pediatric cath lab and one of the nation's highest-volume adult congenital catheterization programs.

Our two dedicated state-of-the-art cath labs serve both pediatric patients and adults with congenital heart disease—and are staffed by cardiologists with advanced training in pediatric cardiac catheterization and adult congenital cardiac interventions.

Diagnostic—Pre-operative assessment of congenital heart lesions; evaluation of pulmonary hypertension; and monitoring of cardiac transplant patients.

Interventional—Commonly performed procedures include:

- Septal closure (ASD, VSD, PFO)
- Vascular shunt closure (PDA, AVM, coronary fistula)
- Vascular balloon angioplasty and stent placement (pulmonary artery, aortic coarctation, systemic venous obstruction, and pulmonary venous obstruction)
- Balloon valvuloplasty (aortic, pulmonic, and mitral)
- Transcatheter pulmonary valve implantation
- Hybrid and fetal intervention

To optimize outcomes and improve the safety of interventional catheterizations—at Duke and nationally—we track our proficiency through the **American College of Cardiology IMPACT Registry** and the Congenital Cardiovascular Interventional Study Consortium's **Catheter Complication Registry.**

Duke has performed more than 30 transcatheter pulmonary valve replacements since 2009, and is one of only a handful of U.S. centers experienced in implanting both available transcatheter pulmonic valves.

Fetal Cardiology

Advanced in-utero evaluation and management of congenital heart disease

We at Duke believe the best care of a child with heart disease begins before the child is born. As a result, the Duke Fetal Cardiology Program was created to offer the most cutting-edge diagnostic, consultative, and treatment services to families of fetuses with known or suspected cardiac conditions.

Our clinicians work closely with a team that includes obstetricians, neonatologists, cardiac intensivists, cardiologists, and pediatric cardiac surgeons to deliver truly comprehensive care.

We perform about 1,100 diagnostic fetal echocardiograms each year for indications that include family history of congenital heart disease; fetal arrhythmias and other detected abnormalities; maternal diabetes, autoimmune disease, and medication exposure; and known or suspected genetic syndromes.

If an abnormality is discovered, our specialists—in tandem with the referring physician—make recommendations about follow-up, delivery planning, and postnatal management. Most patients can continue seeing their obstetricians for prenatal care; our team is committed to prompt and thorough communication with partner physicians, and a fetal cardiologist is always on call.

Areas of special expertise include:

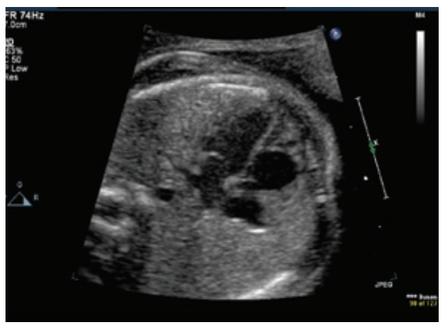
Treatment of fetal heart block related to maternal autoimmune disease—Working with the Division of Rheumatology and Immunology to manage maternal health, we have successfully treated fetal heart block and associated cardiac failure.

Fetal intervention—Duke's Fetal Cardiology team was North Carolina's first to create in utero an atrial septal defect in a fetus with hypoplastic left heart syndrome and an intact atrial septum. We consider fetal interventions by case, in conjunction with Maternal-Fetal Medicine faculty.

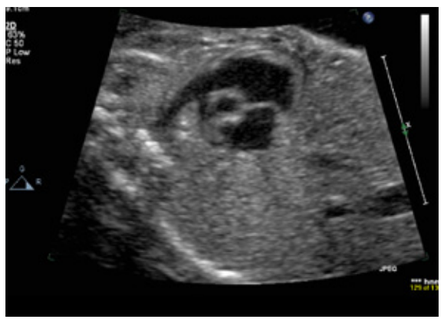
Hybrid perinatal surgery—A multidisciplinary team of pediatric cardiac specialists stands by in cases of infants at high risk for being critically ill at delivery due to complex heart disease—enabling the team to treat the most serious problems in the OR immediately after birth. Infants are then allowed to recover enough to proceed to full surgical repair.

Perinatal triage and family bonding—Our comprehensive approach focuses on preparing families for infants' unique needs and fostering family bonding with their new members. Whenever possible, we encourage mothers to breastfeed their newborns—and families to hold them—before the infants proceed with heart-related care. Our team can also connect families with Duke lactation counselors, social workers, physical therapists, and others.

Duke Children's Heart Program is **North Carolina's leading referral center for single-ventricle disorder surgery**—and is unique in that our Fetal Cardiology Program is coupled to a dedicated Single-Ventricle Program (page 7), to which infants with single-ventricle disorders such as hypoplastic left heart syndrome are automatically transitioned after delivery.



Four-chamber view of the fetal heart prior to 20 weeks gestation using high-frequency transducer



Base of the fetal heart prior to 20 weeks gestation using high-frequency transducer

Duke Children's Heart Program brings joy to a local family

From fetal diagnosis to reparative surgery, Duke Children's Heart Program's team approach leads to excellent outcomes for children like Alegria.

SINCE DALIA PATINO-ECHEVERRI suffered complications when she and husband Miguel Rojas-Sotelo were expecting their first child (son Joel), her obstetrician scheduled an ultrasound at week 33 of her second pregnancy to make sure there were no signs of trouble.

When the images showed a suspected ventricular septal defect (VSD) in the baby's heart, Dalia was referred to Duke Children's Fetal Cardiology Program, where a same-day fetal echo confirmed the VSD—and discovered two additional congenital heart abnormalities: an atrial septal defect (ASD) and an interrupted aortic arch.

During the final weeks of the pregnancy, Dalia and Miguel, who live in Durham, North Carolina, met several times with the Fetal Cardiology team as well as with their pediatric cardiothoracic surgeon to discuss the complex three-pronged surgery the team recommended the baby undergo soon after delivery.

After Alegria Rojas-Patino's January 15, 2011, arrival at Duke, she and her family were able to spend five days getting acquainted before the surgical team successfully repaired her interrupted aortic arch and closed both septal defects.

After a weeklong stay in the Pediatric Cardiac ICU and two nights in Duke Children's Hospital, Alegria—whose name is Spanish for *joy*—was sent home with an excellent prognosis. "That was the happiest day of our lives," says Dalia.

"We can't express our gratitude for the care our family has received from Duke Children's Heart Program," she says. "In addition to providing state-of-the-art care, they have a truly amazing team of people who all go beyond what is expected to minimize the suffering of patients and families. From the receptionists to the surgeons, everyone has always made time to answer our questions, address even our smallest concerns, and give us a kind smile."

At seven months old, Alegria is a "thriving, happy, smiley baby who honors her name," says Dalia. "She's no longer on any medications, and although she'll continue to see her Duke heart team regularly for a while, we've been advised to treat her like the normal baby she is.

"We feel the tremendous peace of being absolutely sure that Alegria had and continues to have the best possible care at Duke."

In 1991 Duke Children's performed North Carolina's first **radiofrequency catheter ablation of supraventricular tachycardia** in a child. Since then, we have performed more than 2,000 such procedures—with a success rate of more than 99 percent.

We offer dedicated arrhythmia and pacemaker management clinics throughout North Carolina.

Electrophysiology and Device Management

Among the nation's largest pediatric electrophysiology programs

Duke Children's Pediatric Electrophysiology Program delivers a full range of sophisticated diagnostic and treatment services to infants, children, adolescents, and young adults with all types of cardiac electrical disorders—both with and without congenital heart disease. These include:

- **Diagnostic arrhythmia evaluation**—Several procedures are available to determine the etiology of symptoms such as syncope, palpitations, chest pain, and unusual shortness of breath when the history, physical exam, and ECG fail to do so. These include ambulatory monitoring; transesophageal electrophysiologic intracardiac testing; exercise testing (page 3); diagnostic drug evaluation including intravenous infusions; and assessment for the risk of sudden death.
- **Ablative therapy**—Ablation is used to treat tachyarrhythmias such as ventricular and supraventricular tachycardias, Wolff-Parkinson-White syndrome, atrial flutter, and focal atrial tachycardias. It is often chosen as an alternative to drug therapy because it eliminates the issues of drug side effects, non-compliance, and arrhythmia breakthrough.
- **Cardiac rhythm device management**—Our services include the implantation of pacemakers, cardioverter defibrillators, biventricular pacing leads and devices, and epicardial and hybrid epicardial-transvenous pacing systems. We also offer laser-powered lead extraction, generator changes, and ongoing trans-telephonic monitoring of device function.
- **Cardiovascular autonomic nervous system testing**—Such testing is used after other tests rule out a life-threatening condition to assess and manage syncope and other autonomic nervous system disorders in patients with conditions that are atypical or unresponsive to standard therapy. Available procedures include head-up tilt testing with continuous rhythm telemetry capability, blood pressure and middle cerebral artery blood-flow monitoring, and when indicated, electroencephalography.

Specialty Clinics

Prevention/Hyperlipidemia Clinic—This family-centered service evaluates children with hypertension, hyperlipidemia, and metabolic syndrome and is administered in conjunction with the Duke Children's Healthy Lifestyles Program (dukehealth.org/services/childhood_obesity/treatments), a pediatric weight-management initiative. The clinic helps to improve patients' diets and lifestyles through personalized counseling with a pediatric cardiologist and pediatric registered dietician. In addition, we evaluate children with essential hypertension and familial hyperlipidemia with counseling and pharmacologic therapy, as needed. Located at Duke Children's Hospital & Health Center.

Duke Pediatric Cardiovascular Genetics Program*—Serves patients of all ages by offering genetic evaluations for patients with medical and developmental conditions that include congenital heart disease or other heart problems. The clinic can identify certain genetic causes of heart failure long before patients become symptomatic, enabling proactive treatment. Assessments for patients with family histories of inherited cardiovascular conditions are possible. In addition to participating in clinical trials, the clinic has dedicated programs for cardiovascular genetics, as well as connective-tissue disorders such as the Marfan syndrome. Located at Duke Children's Hospital & Health Center.

Single-Ventricle Clinic—The Single-Ventricle Clinic is the outpatient foundation of the dedicated Single-Ventricle Program (page 4). This clinic serves pediatric patients with single-ventricle disorders such as hypoplastic left heart syndrome. Organized with a multidisciplinary team approach, the clinic is staffed by a pediatric cardiologist, social worker, speech pathologist and nutritionist, as well as a nurse clinician who coordinates the care of these complex patients, sees them during weekly clinic visits, and maintains between-visit contact. Additional screening and care for developmental issues are coordinated through the Special Infant Care Clinic. Located at Duke Children's Hospital & Health Center.

Adult Congenital Heart Disease Clinic—Part of the top-ranked Duke Heart Center, this dedicated service—one of the largest in the United States—evaluates and treats adults with congenital heart disease, a number of whom were transitioned from the Duke Children's Heart Program. Located in Duke University Hospital, the program is a top referral center in the Southeast and one of the world's few major training programs in adult congenital heart disease.

* The Duke Adult Cardiovascular Genetics Clinic is located at Duke Health Center at North Duke Street.

Our pediatric cardiothoracic surgeons—both of whom have earned the American Board of Thoracic Surgery's Certificate of Special Competence in Congenital Cardiac Surgery—perform **nearly 400 procedures each year, with outcomes that meet or exceed Society of Thoracic Surgeons (STS) benchmarks**.

North Carolina's first hybrid OR enables physicians to simultaneously perform percutaneous and open procedures.

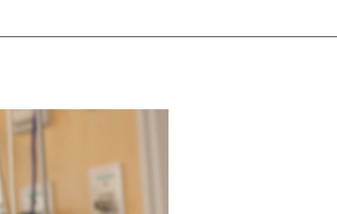
Pediatric and Congenital Heart Surgery

High volumes, exceptional outcomes

An international referral center for congenital cardiac surgery, Duke Children's Heart Program delivers superb care to infants and children with cardiac abnormalities—both congenital and acquired—and to adults* with congenital cardiac abnormalities.

The program is classified by the Society of Thoracic Surgeons (STS) as a high-volume center, a crucial consideration in light of the established relationship between volume and quality in complex areas of health care.

2010 adult and pediatric congenital surgery volumes



To restore optimal cardiac function to children as early in life as possible, the program focuses on neonatal correction** of most conditions—an approach facilitated by our Fetal Cardiology Program, which identifies cardiac abnormalities before birth—and the use of the least invasive techniques possible. Offerings include:

- **Norwood procedure** for treating hypoplastic left-heart syndrome and related disorders
- **Aortic valve repair and valve-sparing aortic root replacement** for connective-tissue disorders such as Marfan syndrome (the program is a national leader in the use of the Ross procedure in treating aortic valve disease.)
- **Arterial switch procedure** for transposition of the great arteries
- Implantation of **cardiac synchronization devices and defibrillators**
- **Skill in treating the entire range of congenital conditions**, including interrupted aortic arch; aortic stenosis; aortic coarctation; atrioventricular canal defects; total anomalous pulmonary venous return (TAPVR); and pulmonary atresia
- An active program in **pediatric cardiac transplantation** and **mechanical circulatory support** (page 9)

* See page 7 to learn more about Duke's Adult Congenital Heart Clinic.
** Fetal diagnosis is ideal. See page 4 for details.

Pint-sized VAD provides a successful bridge to transplant

BOBBY ARNOLD was born with complex congenital heart disease consisting of double outlet right ventricle, a small left ventricle, and transposition of the great vessels. He underwent three operations in his first year of life to repair the defects, but as he approached his third birthday, he became progressively sicker and developed clots in his heart and peripheral arteries. As Bobby's heart became weaker, it became apparent that he would need a transplant, so he was referred to the Duke Pediatric Heart Transplant Program. To support his failing heart until his transplant, Duke doctors implanted an investigational ventricular assist device (VAD) known as the Berlin Heart—the only VAD small enough for a child less than five years old. The VAD did its job well, and Bobby received his new heart three days after his third birthday in March. His family had a party at the end of the summer to celebrate six months of good health after the transplant. There were lots of Spider-Man toys—and one happy three-year-old.

Pediatric Heart Failure Program

North Carolina's largest, an array of advanced therapies

Duke Children's dedicated Pediatric Heart Failure Program offers a number of options to manage and support children with end-stage heart disease, regardless of the cause. In all cases, our multidisciplinary team delivers coordinated care, family support, and long-term follow-up.

We provide:

- **State-of-the-art medical management**, including access to Duke clinical trials of promising drug therapies
- **Implantable devices**, including biventricular pacemakers and defibrillators
- **Ventricular assist devices (VADs)**—as both a bridge to recovery and to transplant—including the HeartMate II, the HeartWare, and the child-specific Berlin Heart EXCOR.
- **Extracorporeal membrane oxygenation (ECMO)**, both stationary and mobile

In some cases, cardiac transplantation is the only option for children with failing hearts. The **Duke Pediatric Heart Transplant Program**, North Carolina's largest, delivers exceptional outcomes (page 8). Duke is currently the state's only program performing cardiac transplants in infants, offering an ABO-incompatible protocol in selected cases.

Cardiac Anesthesiology

Duke's highly specialized pediatric cardiac anesthesiologists serve every pediatric heart patient undergoing a procedure that requires sedation or anesthesia—nearly 1,000 annually—from complex cardiac surgeries to diagnostic and interventional catheterization procedures.

In addition to providing around-the-clock, 365-day coverage, the team advises Duke's general pediatric anesthesiologists caring for young heart patients undergoing non-cardiac surgical procedures.

Pediatric Cardiac Intensive Care Unit (PCICU)

North Carolina's largest and most specialized

The dedicated 13-bed PCICU delivers highly skilled medical and surgical care to children with life-threatening cardiac conditions. Staffed 24/7 by physicians board-certified in cardiology and critical care medicine, the state-of-the-art unit is equipped to serve patients with a range of special needs, and offers both mobile and stationary extracorporeal membrane oxygenation (ECMO).

- **Excellent outcomes**—Much lower mortality and morbidity rates than the mean results reported in the Society of Thoracic Surgeons Congenital Heart Database
- **Extremely low infection rates**, particularly for catheter-associated bloodstream infections (unit protocols are used nationally), ventilator-associated pneumonia (zero incidents between 2008-11), and urinary-tract infections
- **Patient hand-off process** named a Joint Commission "Best Practice" in 2010
- **Family-centered rounds** encourage relatives to actively partner in patient care, facilitate discussion with care teams, and enable them to review daily treatment goals*

* Part of a Six Sigma initiative that standardized the process for communicating daily treatment goals in Duke Children's Critical Care. The change resulted in a 29 percent jump in agreement about goals among care teams. (Targeted interventions improve shared agreement of daily goals in the pediatric intensive care unit. Rehder KJ et al. Pediatr Crit Care Med. 2011 Apr 7.)

All three Duke University Health System hospitals have earned Magnet status for nursing excellence from the American Nurses Credentialing Center.

Cardiac Nursing

Focus on family-centered care, education, and advocacy

The Duke Children's Heart Program is staffed by a dedicated team of more than 150 pediatric cardiac nurses who deliver evidence-based care to all inpatients and outpatients. All have advanced training in the care of infants and children with congenital and acquired heart disease.

The team, which includes registered nurses, nurse practitioners, certified pediatric nurses, and family educators—a number of whom hold master's and doctoral degrees—provides the highest-quality cardiac care at bedsides and in related labs and outpatient clinics, and serves as a critical part of the program's multidisciplinary care team.

To ensure optimal outcomes, these nurses also coordinate ongoing outpatient care, serve as patient and family advocates, educate parents and school faculty about managing children's daily and long-term needs, and facilitate open communication between care teams and families.

Many have areas of special interest (including home monitoring, interventional catheterization, and transplant outcomes); are critical-care certified; lead translational research efforts; and head and belong to organizations such as the National Association of Pediatric Nurse Practitioners and the American Nurses Credentialing Center.

Our nurses are regularly recognized with Duke University Hospital **Patient Satisfaction Awards** for their work in the pediatric echo, electrophysiology, and cath labs. Many have earned or been nominated for Friends of Nursing awards and/or are members of Sigma Theta Tau, the international nursing honor society.

Outreach

Duke pediatric cardiac nurses also provide community outreach services, including:

- Triangle Mended Little Hearts*
- North Carolina chapter of the Children's Cardiomyopathy Foundation*
- Participation in community health fairs and the annual AHA Heart Walk

* Led in conjunction with Duke Children's pediatric cardiologists

Research

Efforts result in improved outcomes and care quality, at Duke and elsewhere

Duke's Children's Heart Program faculty and fellows are engaged in a wide variety of innovative research efforts related to congenital and acquired heart disease. Most of our clinical research is conducted in collaboration with the acclaimed Duke Clinical Research Institute, enabling us to efficiently translate the most promising new evidence-based therapies and technologies to the bedside.

Clinical—Duke is conducting clinical trials in areas that include:

- Single-ventricle defects
- Cardiomyopathy
- Percutaneous catheter-based therapies
- Novel surgical techniques
- Pulmonary and systemic hypertension
- Heart failure
- Fetal cardiology
- Arrhythmias, including supraventricular tachycardia
- Cardiac imaging, including 3-D echo and MRI
- Syncope
- Outcomes of congenital surgery, arrhythmia ablation, cardiac transplant, and ICD implantation

Translational—Areas of translational research include novel therapies for Pompe disease and Duchenne's muscular dystrophy, as well as projects evaluating the stability of cardiac response to pacing.

Basic—Areas of basic research include cardiovascular genetics and the etiology and pathogenesis of congenital heart defects, such as neural-crest development.

Selected publications

The following are just some of the 100-plus articles published by Duke Children's Heart Program faculty in 2010-11:

Pasquali SK, Hall M, Li JS, Peterson ED, Jaggers J, Lodge AJ, Marino BS, Goodman DM, Shah SS. Corticosteroids and outcome in children undergoing congenital heart surgery: analysis of the Pediatric Health Information Systems database. Circulation. 2010 Nov 23;122(21):2123-30. Epub 2010 Nov 8. PMID: 21060075

Evans SM, Yelon D, Conlon FL, Kirby ML. Myocardial lineage development. Circ Res. 2010 Dec 10;107(12):1428-44

Li JS, Flynn JT, Portman R, Davis I, Ogawa M, Shi H, Pressler ML: The efficacy and safety of the novel aldosterone antagonist eplerenone in hypertensive children: a randomized, double-blind dose-response study. Journal of Pediatrics 2010 Aug; 157(2):282-7. (PMID: 20400095)

Barker PC, Pasquali SK, Darty S, Ing RJ, Li JS, Kim RJ, DeArmey S, Kishnani PS, Campbell MJ. Use of cardiac magnetic resonance imaging to evaluate cardiac structure, function and fibrosis in children with infantile Pompe disease on enzyme replacement therapy. Mol Genet Metab. 2010 Dec;101(4):332-7. (Epub 2010 Jul 23. PMID: 20875764)

Vertilus SM, Austin SL, Foster KS, Boyette KE, Bali DS, Li JS, Kishnani PS, Wechsler SB. Echocardiographic manifestations of Glycogen Storage Disease III: increase in wall thickness and left ventricular mass over time. Genet Med. 2010 Jul;12(7):413-23. (PMID: 20526204)

Trivedi B, Smith PB, Barker PC, Jaggers J, Lodge AJ, Kanter RJ. Arrhythmias in patients with hypoplastic left heart syndrome. Am Heart J. 2011 Jan; 161(1):138-44. (PMID: 21167346)

Doshi AN, Idriss SF. Effect of resistive barrier location on the relationship between T-wave alternans and cellular repolarization alternans: a 1-D modeling study. J Electrocardiol. 2010 Nov-Dec;43(6):566-71. (PMID: 21040826)

Pasquali SK, Sun JL, d'Almada P, Jaquiss RDB, Lodge AJ, Miller N, Kemper AR, Lannon CM, Li JS. Center variation in hospital costs for patients undergoing congenital heart surgery. Circ Cardiovasc Qual Outcomes. 2011 May 1;4(3):306-12. (Epub 2011 Apr 19)

Johnson JN, Ansong AK, Li JS, Xu M, Gorentz J, Hehir DA, del Castillo SL, Lai WW, Uzark K, Pasquali SK. Celiac artery flow pattern in infants with single right ventricle following the Norwood procedure with a modified Blalock-Taussig or right ventricle to pulmonary artery shunt. Pediatr Cardiol. 2011 Apr;32(4):479-86. (Epub 2011 Feb 18. PMID: 21331516)

Fudge JC Jr, Li S, Jaggers J, O'Brien SM, Peterson ED, Jacobs JP, Welke KF, Jacobs ML, Li JS, Pasquali SK. Congenital heart surgery outcomes in Down syndrome: analysis of a national clinical database. Pediatrics. 2010 Aug;126(2):315-22. (Epub 2010 Jul 12. PMID: 20624800)

Li JS, Colan SD, Sleeper LA, Newburger JW, Pemberton VL, Atz AM, Cohen MS, Golding F, Klein GL, Lacro RV, Radojewski E, Richmond ME, Minich LL. Lessons learned from a pediatric clinical trial: the Pediatric Heart Network angiotensin-converting enzyme inhibition in mitral regurgitation study. Am Heart J. 2011 Feb;161(2):233-40. (PMID: 21315203)

Burstein DS, Jacobs JP, Sheng S, O'Brien SM, Rossi AF, Checchia PA, Wernovsky G, Welke KF, Peterson ED, Li JS, Jacobs ML, Pasquali SK: Care models in congenital heart surgery and associated outcomes. Pediatrics. 2011 Jun;127(6):e1482-9. (Epub 2011 May 16)

Training

Duke's Pediatric Cardiology Fellowship Program and Cardiothoracic Surgery Residency Program train talented young physicians to expertly care for children with congenital and acquired heart disease, as well as adults with congenital heart disease. Both programs prepare trainees to serve as leaders in clinical care, research, education, and policy-making.

Duke Pediatric Cardiology Fellowship Program

Areas of training include general pediatric cardiology; interventional catheterization; non-invasive imaging; electrophysiology; critical care; fetal cardiology; adult congenital heart disease; health care delivery and outcomes research; and molecular biology and translational research. Learn more at pediatrics.duke.edu/divisions/cardiology (click "Education") or by dialing 919-681-8485.

Duke Cardiothoracic Surgery Residency Program

We provide training in pediatric and adult congenital cardiac surgery. For details, visit cardio.surgery.duke.edu (click "Education and Training") or call 919-684-4891

Duke clinicians deliver expert, family-centered care to pediatric cardiology and/or adult congenital heart patients at these community-based practices and hospitals throughout the region. For detailed maps and further information, visit **dukehealth.org/locations.**

1. **DUKE CHILDREN'S CARDIOLOGY OF BURLINGTON**
   Medical Arts Building, Suite 1600
   1236 Huffman Mill Road
   Burlington, NC 27215
   Appointments 336-586-3960
   Fax 336-586-3588 (Scheduler)
   Fax 336-586-3923 (Clinic)

2. **DUKE PEDIATRIC ELECTROPHYSIOLOGY AT PRESBYTERIAN PEDIATRIC CARDIOLOGY (CHARLOTTE)**
   1718 East 4th Street, Suite 304
   Charlotte, NC 28204
   Office 704-316-1220
   Fax 704-316-1230

3. **DUKE CHILDREN'S CARDIOLOGY OF FAYETTEVILLE**
   3427 Melrose Road
   Fayetteville, NC 28304
   Office 910-323-5940
   Fax 910-323-9746

4. **DUKE CHILDREN'S CARDIOLOGY OF FORT BRAGG AT WOMACK ARMY MEDICAL CENTER**
   Normandy Drive
   Fort Bragg, NC 28310
   Office 910-907-7337
   Fax 910-907-8788

5. **DUKE CHILDREN'S CARDIOLOGY OF GREENSBORO**
   1126 North Church Street, Suite 203
   Greensboro, NC 27401
   Office 336-235-0944
   Fax 336-235-0951

6. **DUKE CHILDREN'S CARDIOLOGY OF LAURINBURG AT SCOTLAND MEMORIAL HOSPITAL**
   500 Lauchwood Drive
   Laurinburg, NC 28352
   Office 910-291-7675
   Fax 910-276-3059

7. **DUKE CHILDREN'S CARDIOLOGY OF LUMBERTON AT LUMBERTON CHILDREN'S CLINIC**
   400 Liberty Hill Road
   Lumberton, NC 28358
   Office 910-739-3318
   Fax 910-671-3600

8. **DUKE CHILDREN'S CARDIOLOGY OF RALEIGH**
   3480 Wake Forest Road, Suite 310
   Raleigh, NC 27609
   Appointments 919-668-4000
   Office 919-862-5750
   Fax 919-863-5355

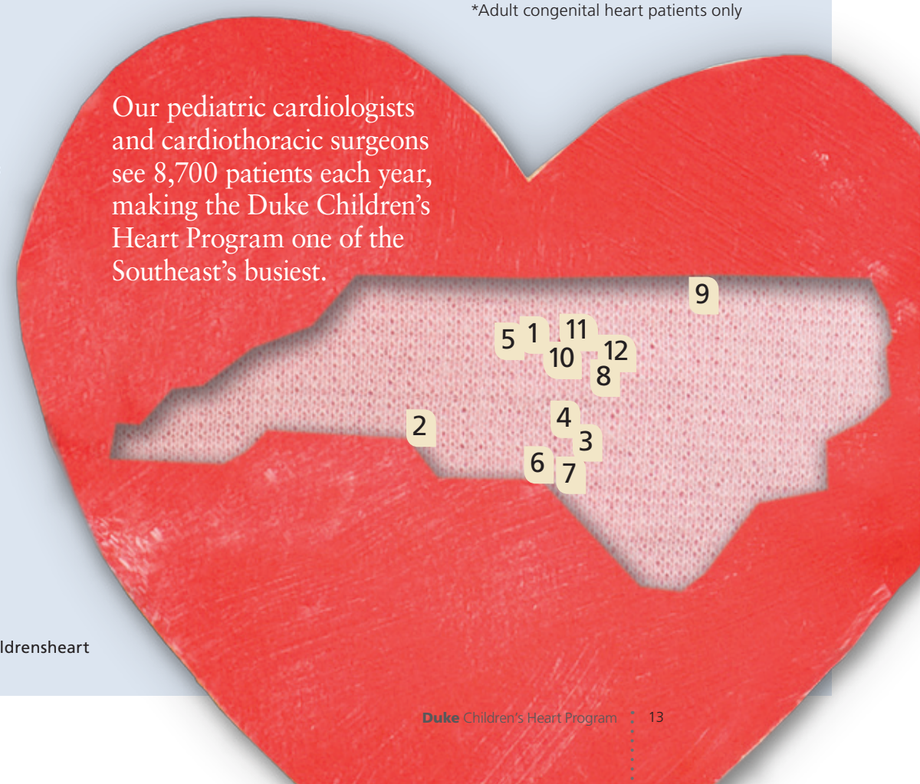
9. **DUKE CHILDREN'S CARDIOLOGY OF ROANOKE RAPIDS AT HALIFAX REGIONAL MEDICAL CENTER**
   250 Smith Church Road
   Roanoke Rapids, NC 27870
   Office 252-535-8168
   Appointments 252-535-8888
   Fax 252-535-8589

10. **DUKE CHILDREN'S HOSPITAL & HEALTH CENTER; DUKE UNIVERSITY HOSPITAL**
    2301 Erwin Road
    Durham, NC 27710
    Appointments (Duke Children's) 919-668-4000
    Main 919-684-8111
    Fax 919-681-8927

11. **DUKE HEALTH CENTER AT NORTH DUKE STREET***
    3116 North Duke Street
    Durham, NC 27704
    Office 919-660-2200, 919-660-2399
    Fax 919-660-2383

12. **DUKE CARDIOLOGY OF RALEIGH***
    Adult Congenital Clinic
    Medical Office Building 6
    3320 Wake Forest Rd., Suite 20
    Raleigh, NC 27609
    Appointments 919-862-5100 – (prompt 1)
    Fax 919-862-5104

*Adult congenital heart patients only



Please refer to **dukehealth.org/childrensheart** for the most current listing.

Consultations and referrals

Physicians—To schedule an appointment, refer a patient, get information about directly admitting a patient, or learn more about Duke Children's Heart Program, dial the Duke Consultation and Referral Center at **800-MED-DUKE (633-3853)** toll-free or **919-416-DUKE (416-3853)** locally.

Patients—For more information about Duke Children's Heart Program, dial **888-ASK-DUKE (275-3853)** toll-free.

Important phone numbers

Division of Pediatric Cardiology: 919-681-2916
(Monday to Friday, 8:00 a.m. to 5:00 p.m.)

Duke Children's Hospital & Health Center: 919-668-4000

Duke University Hospital: 919-684-8111

On-call pediatric cardiologist: 919-684-8111
(Ask operator to page)

Pediatric Cardiac ICU: 919-684-8111
(Ask operator to page on-call PCICU attending physician)

Pediatric and Congenital Cardiac Surgery: 919-681-2343
(Monday to Friday, 8:00 a.m. to 5:00 p.m.)
919-668-4000(after hours; ask operator to page Dr. Lodge or Dr. Jaquiss)

Urgent ECG interpretation: 919-684-8111
(Ask operator to page on-call pediatric cardiologist)

Learn more online

Main site: dukehealth.org/childrensheart

Clinical trials
dukehealth.org/clinicaltrials

Division of Pediatric Cardiology
pediatrics.duke.edu/divisions/cardiology

Duke Children's Hospital & Health Center
dukechildrens.org

Duke Clinical Research Institute: dcri.org

Duke Medicine: dukehealth.org

Office of Continuing Medical Education: cme.mc.duke.edu

A PDF of this publication: dukemedicine.org/pedsheartreport

Giving

Learn how you can support Duke Children's efforts to advance pediatric cardiovascular health through clinical care, research, and education by contacting Linden B. "Blue" Dean or Jim Ervin at **919-385-3100**.

Duke Children's HOSPITAL & HEALTH CENTER

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