

# hope

CHILDRENSHOSPITALVANDERBILT.ORG

SUMMER/FALL 2020



## Caring For Our Community

Our new Murfreesboro facility brings quality pediatric care closer to where families live







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SUMMER/FALL 2020



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**T**HE WORLD HAS CHANGED since we last connected with you. We are more than five months into something none of us have experienced — a pandemic. In our medical training, we all knew the terminology and history from 1918, but there was no formal learning in either medical or leadership courses on managing through a pandemic. By all counts, as you read this edition of *Hope*, we are still in the earlier phases of this virus running its course.

What has COVID-19 meant for Monroe Carell Jr. Children's Hospital at Vanderbilt? Well, simply put, it has further galvanized what we do every day — bring multidisciplinary teams together to solve problems that impact children and determine our role as a member hospital of a major academic medical center. We have worked together, in both small and large groups, to outline our response. By the time of your reading, we will be well past 150 days of many of our teams working collaboratively to establish best practices, to study why children respond differently than adults to infection with this virus and to investigate treatments as well as vaccine prevention. This is what we do every day — connect excellence in clinical practice with education and discovery — though these particular efforts have been at an accelerated pace.

Although this issue of *Hope* does not focus on our response to COVID-19, the stories you will read showcase unique programs that illustrate this great teamwork. We highlight our pediatric gastroenterology division's breadth of programs through the voice of our patients and their families, our craniofacial program's multidisciplinary center and we introduce our newest clinical site, Monroe Carell Jr. Children's Hospital Vanderbilt Surgery and Clinics Murfreesboro, where we bring our expertise to families closer to where they live.

These stories all speak to teamwork with a single commitment to serve children through connecting learning and discovery to advancements in clinical care. Our teamwork, once again, has resulted in being recognized for the 14th consecutive year by *U.S. News and World Report* as a top Children's Hospital, ranking in all 10 specialties. This achievement is possible because of the dedication of our faculty, trainees and staff, the support of our community, and the belief in what we do every day to provide healing and hope for our patients and families. In these uncertain times, it is this mission that has not only grounded us but also provided our guiding light.

Sincerely,

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Steven Webber, MBChB, MRCP  
*Pediatrician-in-Chief, Chair of the Department of Pediatrics and James C. Overall Professor*

Jeffrey Upperman, MD  
*Surgeon-in-Chief and Chair of the Department of Pediatric Surgery*

John W. Brock III, MD  
*Senior Vice President of Pediatric Surgical Services, Monroe Carell Jr. Professor, Surgeon-in-Chief Emeritus*

*President*

Monroe Carell Jr. Children's Hospital at Vanderbilt  
**Meg Rush, MD, MMHC**

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# Prepared to Lead

*Nearly four decades of experience readies Rush for Presidency*

written by Christina Echegaray

photograph by Donn Jones

**O**n March 8, a month after Meg Rush, MD, MMHC, was named President of Monroe Carell Jr. Children's Hospital at Vanderbilt, the first adult case of the novel coronavirus, COVID-19, was diagnosed in Nashville, Tennessee.

While the virus primarily affects adults in both infections rates and severity of illness, Children's Hospital, which stands as part of a large Level 1 trauma center at Vanderbilt University Medical Center, sprang into action to prepare, plan and support its colleagues in adult health care.

For many, beginning an important institutional leadership role that can shape a hospital and its programs for decades, there can be a settling in period over the first 100 days. Rush had just 30 days before she, Children's Hospital and teams across the Medical Center were thrust into the worst international pandemic humans have seen since the Spanish flu in 1918. There's no handbook, or a crystal ball, on how to lead during a pandemic.

What she possesses, however, is experience, drawing from 36 years in health care at Vanderbilt, first as a resident, then as a researcher, clinician and administrative leader; her ability to connect and communicate with people; and perhaps most importantly, the influence of her family roots, particularly her dad.

"I went into medicine to serve people. I have a deep emotional intelligence and I want to connect with people. I get a lot of that from my dad," Rush said. "I want the people who work in Children's Hospital to feel like I care about them, because I do. I am not this abstract person. I want people to have some insight into who I am."

## Leaning in

Rush, an Ohio native, hadn't originally planned to study medicine. Marine Biology, or something in the sciences, was her intended major, she admits. During an annual family summer trip to Michigan with her mom, dad and two brothers, before her sophomore year of college at DePauw University, her dad, Richard Goettle, asked why she was "dancing around" the subject of going into medicine.

"Why aren't you embracing medical school? What's holding you back?" my dad asked. My first response was that there weren't many women that go to medical school and have a family, and I had hoped to do that someday," Rush said.

"You'll figure that out as you go," her dad told her.

So, she leaned in, restructuring her junior year of college to put herself in a medical environment. She did a rotation in genetics at Indiana University Medical Center at Riley Children's. That solidified her path in medicine, though not to pediatrics — yet.

At the University of Cincinnati College of Medicine, she was drawn to children, but a difficult pediatrics rotation during RSV and rotavirus seasons made her unsure it was her career path. A career as an obstetrician-gynecologist also wasn't a fit for her, though she gravitated toward the newborns. Still she wavered.

Following a rotation with a cornea specialist, she decided to pursue an ophthalmology residency, which she jokes is ironic because she doesn't like her eyes touched. Her school dean warned that she and her then husband, Charles Rush, MD, an OB-GYN, would have a tough time getting a couples match for residency in the same city with ophthalmology as her choice.

Again, she pivoted, finally settling on pediatrics. They matched at Vanderbilt University Medical Center (VUMC), their first choice, in 1984.

## Soup to nuts

Rush arrived at VUMC as a motivated resident who began to find her passion in neonatology, caring for the hospital's tiniest patients. At the time, pediatric care was delivered on three inpatient floors within the adult hospital at Vanderbilt.

She stayed at Vanderbilt for her fellowship in neonatal-perinatal medicine under the leadership of Mildred Stahlman, MD, the pioneer of the modern neonatal intensive care. Rush



quickly knew she had found her home at Vanderbilt and Nashville. She joined the faculty in 1990, also giving birth to her first daughter, Katie, that year. Three years later, her younger daughter, Libby, was born.

In her early years at Vanderbilt, Rush established herself as a basic science researcher, studying the role of vitamin A in lung repair following injury that occurs with mechanical ventilation as well as in early embryonic lung development. Her work was significantly influenced by the guidance of two mentors, Stahlman, and the late Tom Hazinski, MD, former chief of the Division of Pediatric Pulmonary Medicine.

This research experience facilitated her role with the Institutional Review Board, helping restructure the institution's policies and direction in human subjects research, particularly as it pertained to children. (Her connection to research is never far even in her role as President. She keeps photos of her research slides in her desk drawer.)

At every step, Rush accepted opportunities presented to her, diving in to learn all aspects of each new role — no matter how daunting — and always pursuing excellence along the way. Over the years, she has served as program director for the Fellowship in Neonatal-Perinatal Medicine, associate director of Pediatric Transport, medical director of Neonatal Transport and co-chair of the Ethics Committee.

"Every chapter of my career has given me experience and leadership skills, soup to nuts, about how everything runs in this hospital," Rush said.

Continuing as an emerging senior administrative leader, she was named chief of staff of Children's in 2007. A year later she was named a "Woman to Watch in Medicine" by *Nashville Medical News*.

She subsequently added the responsibilities of executive medical director in 2012. She has led the development of program strategies for the hospital's business enterprise — on and off campus — served as a representative from administration to the hospital's medical staff and led vital quality and safety initiatives. In 2014, she earned her Master of Management in Healthcare from Vanderbilt's Owen Graduate School of Management.

In her administrative role, she has been an integral part of the Children's Hospital leadership team responsible for overseeing a multiyear, multiphase expansion that began with a 33-bed, 30,000-square-foot expansion in 2012, and that continues today with the current four-floor, 160,000-square-foot expansion atop the existing pediatric facility. Well-respected at Children's Hospital as well as with community pediatricians and organizations, Rush is a fervent advocate of quality, compassionate care for children and families.

Her appointment as President in February came at a pivotal time for Children's Hospital as it continues to advance the size and scope of its clinical and surgical programs for children within the hospital as well as offsite to bring care closer to where families live. Also, at the start of COVID-19 in March, Children's Hospital opened its second expansion unit on the 11th floor.

**"I want people to feel a connection to the mission we have — to provide excellent clinical care and support of children who come to us for their health needs."**

### **'Tacking'**

When COVID-19 hit Nashville, changing the way Children's Hospital and the larger VUMC community would operate, Rush pulled everything she knew from her career and personal influences into her leadership role.

"As COVID has evolved, we have acted on the best information we have. We've made decisions with all that we know at the time, pulling back when we needed to," Rush said.


Many of her influences are also reflected in her weekly, and sometimes twice weekly, communication messages to faculty, staff and trainees. She has provided assurance amid the messiness of the moment and has kept people informed. She's also introduced people to who she is, to her love of quotes, to her devotion to her daughters and their virtual dinners and her desire to connect with employees.

In one communication, she even employed her summer sailing experience with her dad, noting that the pandemic is much like trying to sail without much wind, a tactic known as tacking. It means to zigzag to move forward, which can sometimes be inefficient and frustrating and requires real-time decision-making.

"Tacking requires patience and positivity to ensure one makes the most of each maneuver on the water. To me, tacking is a great metaphor for where we find ourselves today — navigating the uncertain winds of a pandemic," she wrote.

Years ago, Rush's dad told her to exemplify for others a balance between personal and professional life. She has done that, dedicating herself to a career in medicine, to her community and to her daughters, Katie, now 29, and Libby, 26.

She is fully committed to her next chapter at Children's Hospital.

"I have grown just like Children's Hospital has grown. I know how this place is put together, and I know its success is dependent on different areas and the collective work of teams," Rush said. "Our commitment is to patients first. But we are also committed to the faculty and staff here to make it a positive place for people to come to work every day. I want people to feel a connection to the mission we have — to provide excellent clinical care and support of children who come to us for their health needs. This is a really special place. Being connected to the mission we carry out every day makes it more than just a place you come to work — it is a place of hope. I am truly honored to serve in this role and lead this great collective team."  hope



Care close to home means Gus Wolff, 5, can spend more time with Jack the pony.

## CARING FOR OUR COMMUNITY

*Children's Hospital's newest facility brings quality pediatric care closer to where families live*

written by Christina Echegaray  
photograph by Donn Jones

**I**n the lobby of the new Monroe Carell Jr. Children's Hospital Vanderbilt Surgery and Clinics Murfreesboro hangs a reminder of the facility's roots.

A large red paper doll mobile, a mosaic of 2,000 smaller paper dolls, descends from the ceiling of the entrance. The paper dolls icon, first sketched in the early 1970s by a Friends of Children's Hospital member, Carole Nelson, has symbolized the community support for quality, compassionate pediatric health care for children in Nashville and surrounding communities.

The iconic symbol has been carried through the decades as Vanderbilt has grown the size and scope of pediatric health care into the community. Each new clinic or facility Children's Hospital has opened in communities — now more than 20 locations across Tennessee — carries the paper dolls as part of the logo, including its newest location in Murfreesboro, Tennessee.

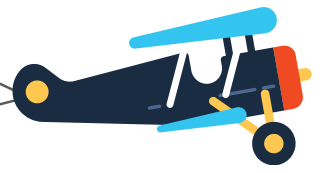
Children's Hospital opened the new \$27.2 million state-of-the-art surgery and clinics facility in December 2019, significantly expanding pediatric specialty care, outpatient surgery and imaging services to children in Rutherford and surrounding counties.

"This was a dream of mine and several others years ago to bring Children's Hospital surgeons and physicians into the Rutherford region," said John W. Brock III, MD, Senior Vice President of Pediatric Surgical Services, Monroe Carell Jr. Professor and Surgeon-in-Chief Emeritus. "These are the exact same surgeons, physicians, nurses, technicians, who would care for a child on the main campus in Nashville. We have built a facility that gives us the ability to care for every aspect of a child — because that's what children deserve."

The single-story facility, located at 2102 West Northfield Blvd., features 22 multispecialty clinic rooms, urgent care services, a suite of operating rooms, imaging capabilities such as MRI, X-ray, ultrasound and audiology booths for hearing tests and procedural areas.

The Murfreesboro facility features care from several of Children's Hospital's nation-





ally ranked specialties including gastroenterology, general surgery, orthopaedics, otolaryngology, audiology and urology.

Children's Hospital was once again named among the nation's best children's hospitals for 2020-2021 by *U.S. News & World Report*, achieving a maximum 10 out of 10 ranked pediatric specialties — the only pediatric facility in Tennessee to earn that distinction.

"The families in that area are super appreciative that we are there. It obviously makes their effort to be seen considerably smaller," said James D. Phillips, MD, assistant professor of Otolaryngology, who also specializes in cleft palates. "I also have families from the other side of town, toward Kentucky or Clarksville, who will drive through Nashville just to come to the Murfreesboro location. They like it because they can avoid the downtown traffic. As far as our ENT service, the clinic experience they get is nearly the exact same as our downtown location."

Parents, like Natalie and Amos Wolff, know first hand that their children get the same care in Murfreesboro as the Nashville campus.

"We know that (at the new facility) the care is going to be the same; you're just taking away the distance," said Amos Wolff, whose three children have spent time at Children's Hospital and have been seen at its clinics in Murfreesboro. "The Murfreesboro facility is ultra-convenient for us. It's a great facility – what they've put into it is amazing, and the care they dedicate toward children is great."

The Wolff's youngest son, Gus, 5, was admitted to Children's Hospital at 5 days old for failure to thrive. They sought care for him again when he was 2 for not being on target verbally. Happy with the experience their two older children — Amos Jr., 10, and Eva, 8, had with Phillips, they sought him out again. Gus failed his hearing test, leading to surgery for ear tubes.

Phillips discovered a submucous cleft palate during that surgery, and Gus began speech therapy to help correct some of the speech issues.

"We were up to seven therapies per week at this time, and with two other kids who are active and a job, for us to go to Vanderbilt is a 40-minute drive one way," Amos Wolff said, noting that clinics in Murfreesboro allow them to continue their routines close to home.

At age 3, Gus had his submucous cleft palate surgically repaired and continued seeing Phillips as well as therapy. While still in intensive therapy, his speech has improved.

During the COVID-19 pandemic, Gus continued visits with Phillips and his speech therapist using telemedicine. Fewer trips to the doctor mean he has time for the things he loves, his dad says, like playing tee ball or with his toy cars and his fascination with fire trucks and police officers. He also enjoys taking horse riding lessons at a local Murfreesboro farm.

Gus will continue to see Phillips as needed at the



*The new 37,000-square-foot facility, which has a bright and airy feel, is thoughtfully designed for families and for doctors, nurses and staff delivering care.*

Murfreesboro facility, Wolff said.


"Hands down, it's a nice facility. The halls are spacious, the waiting areas are good," he said. "I am very thankful for Dr. Phillips and for Vanderbilt."

The 37,500-square-foot-facility is thoughtfully designed, with the building divided into three distinct sections — the surgical suite, the radiology imaging center and the multispecialty exam rooms — with each area identifiable by different colors. A hallway that runs from end to end through the center of the building connects each zone to allow for smooth transitions throughout. The waiting rooms have sensory play areas for children.

The surgical suite has three outpatient operating rooms, 14 pre- and post-operation bays, an isolation room, an IV start room, consultation rooms and a dedicated surgical patient exit area in the back of the building to make post-surgery discharges and pickup easy for families.

Children's Hospital has about 80 employees, including doctors, nurses and additional staff with hopes to expand further. A full-time Certified Child Life Specialist, specially trained in child development, helps children and teens feel comfortable in a medical environment.

The new facility was made possible by generous philanthropic support, including gifts from Katherine "Kitty" and the late Matt Murfree III with their family, The Christy-Houston Foundation, Inc., the late Bernard Wehby, Raiderthon at Middle Tennessee State University, and Lisa and John W. Brock III, MD.

Children's Hospital has been in Rutherford County since 2016, when it opened a Vanderbilt Children's After-Hours and Pediatric Specialty Clinic location in Murfreesboro, located at Kennedy Drive, not far from the new facility. That clinic continues to provide pediatric specialty care in the areas of cardiology, neurology, endocrinology, genetics, diabetes, nephrology, pulmonology, rheumatology and maternal/fetal care.  hope



## GROWTH ALONG A JOURNEY

*John W. Brock III, MD, uses experience and vision to bring pediatric care close to where families live*

written by Jessica Pasley  
photograph by Donn Jones

**E**xpanding the footprint of Monroe Carell Jr. Children's Hospital at Vanderbilt has long been a goal of John W. Brock III, MD.

A veteran of Children's Hospital with more than 30 years' experience, he's been prepping for opportunities to showcase the expertise and services of the hospital.

His first foray into outreach — widening the scope of pediatric urology beyond the main campus located off of 21st Avenue South — came nearly 25 years ago. The concept, a first for the health care facility, was a success. And Brock began to shepherd other specialties in the move toward community-based services.

"What I realized along the way is that we can no longer be a children's hos-

pital," said Brock. "We have to be a children's system. That required taking our brand to the patient, to the individual communities."

Brock's innate desire to build on the solid foundation created at Children's Hospital developed into a newfound strength for him. That strength led to the hospital's newest endeavor — Monroe Carell Jr. Children's Hospital Vanderbilt Surgery and Clinics Murfreesboro which opened in December 2019.

Brock oversaw the \$27.2 million state-of-the-art project that expanded pediatric specialty care, outpatient surgery and imaging services to children in Rutherford and surrounding counties.

The 37,500-square-foot facility's footprint reaches far beyond Middle Tennessee.

### GROWTH

"This is the way of the future," said Brock of the outpatient facility. "Taking our providers to the patient; meeting families where they are, closer to home; making access to our services easier; bringing our brand to the communities that seek our expertise. It is a longtime goal





“This was a dream of mine and several others years ago to bring Children’s Hospital surgeons and physicians into the Rutherford region.”

realized — taking our resources from this one building on Children’s Way and sharing it throughout the region.

“Patients and families assume quality,” he said. “We provide that with no question. What they have asked for is convenience. And we are not stopping with this one building.”

The reviews of the Murfreesboro facility have been resoundingly positive from community members, patient families and employees. Its volumes have shown the kind of impact off-site accessibility can have on patients. In the six months of opening the clinics and outpatient surgery services, there were 16,000 visits, which is ahead of projections even with the COVID-19 pandemic.

Brock pauses in his reflection on the immensity of the Murfreesboro project, one that his friend, the late Luke Gregory, former CEO of Children’s Hospital at Vanderbilt, worked closely on.

“We talked about how to leverage our brand, our name and take it farther out to garner new business and increase our influence. Therein lies the job that Luke and I designed around growth of the enterprise. If we were going to grow, we had to increase our footprint.

“You know people used to say that I wanted all the business that was touching the business that I already had,” he said. “I only know one way to do things.

“I miss my friend Luke,” he said with a hard swallow. “He always called me his point guard,” Brock said chuckling. “I was always out in front and pushing, pushing, pushing the ball down the court and he’d say to me, ‘Uh, we don’t need to run the fastbreak quite so fast.’ That was our lingo.”

That partnership helped move the concept of off-site care facilities to fruition. One that Brock is immensely proud of.

A few months before he died in the fall of 2019, Gregory commended Brock for his dedication and vision of the Murfreesboro facility.

“As we continue to expand our pediatric specialty care out into the community and across the region, Dr. Brock serves a vital role in leading these efforts to ensure we meet the same standard of excellence for patients and families as we provide on our main campus,” Gregory said at the time.

#### WHAT’S NEXT?

The big box model, providing care that is more convenient to the consumer, is expanding to include adults.

Brock is leading projects for the adult enterprise in

Hendersonville, Tennessee, and Belle Meade at the request of C. Wright Pinson, MBA, MD, Deputy CEO and Chief Health System Officer at Vanderbilt University Medical Center.

The Hendersonville facility, slated to open in early 2021, is a 31,000-square-foot facility that will offer adult outpatient specialty care, along with limited pediatric specialty care and imaging services to the citizens of Sumner and surrounding counties.

The Belle Meade facility, a 50,000-square-foot building, is projected to open in 2021 and will house outpatient specialty care for adults only.

Brock said there was no question that there was a need to have a presence outside of the traditional walls of the hospital setting and into the community. There was a lot of work around growth patterns, opportunities for patients, needs assessments and the like in preparation for expansion possibilities.

“I strive to be a really good team member,” said Brock of his involvement with the Murfreesboro and Hendersonville expansions. “There are some incredibly bright people who led this team to get that location ready to take care of patients. I stand in awe of the way the team worked to make this happen. We all had to work in lockstep.

“One of my strengths is having the vision to see the big picture and latching on to really talented people and advocating to help them get what they need to succeed,” admitted Brock.


Three decades of service at the same institution has taught Brock a lot about his specialty, the community and himself.

His ties to Vanderbilt are deeply rooted — starting with his time as an undergraduate. After obtaining his degree in history from Vanderbilt University in 1974, he received his medical degree from the Medical College of Georgia in 1978. He returned to VUMC to complete his residency training, where he served as chief resident in Urology and has remained at Children’s Hospital since.

Brock is highly respected throughout the region. His commitment to excellence is well known. The author and co-author of more than 220 scholarly publications and book chapters, Brock has been an invited presenter at nearly 300 gatherings.

After successfully serving as Children’s Hospital’s first Surgeon-in-Chief for 17 years, he began the transition to focus on his role as Senior Vice President of Pediatric Surgical Services and became Surgeon-in-Chief Emeritus in 2019.

“I like where I am headed,” said Brock. “I have been very lucky to have had tremendous success where I am. Growth along this journey and self-reflection about who I am has been really important.

“I’ve been here a long time and learned what really works. I’ve lived through when the hospital was on two floors in the adult hospital. Now we have more than 340 beds, 20 locations in the community (clinics and urgent care) and now this big box facility. This is just the evolution of a children’s hospital system that matches the growth of Nashville and beyond.”  hope



# GUT CHECK

## Gastroenterology team works to unravel patients' complex medical mysteries

If you have children, the odds are high they've suffered from a temporary gastrointestinal issue — in fact, about 60% of health complaints to pediatricians are for GI symptoms — stomachaches, nausea, vomiting, heartburn, constipation.

But sometimes the issues don't go away, are more serious than just run-of-the-mill abdominal issues, and more specialized care is required. The D. Brent Polk Division of Gastroenterology, Hepatology and Nutrition at Monroe Carell Jr. Children's Hospital at Vanderbilt provides comprehensive care for children with nutritional, gastrointestinal or liver disorders including diagnostic evaluations, treatment and disease education.

The division, with 15 specialty programs to support the more complex patient, is nationally among the top 10 busiest programs, ranking 18th in the 2020 *U.S. News and World Report* rankings.

Between 2015 and 2019, patient visits to the division grew by 50% from 12,930 annual visits to 19,735.

"When gastrointestinal complaints affect patients' lives and their ability to have a good quality of life, or if it's a complex case, that's when they are referred to us," said Sari Acra, MD, MPH, professor of Pediatrics and the division's director. "We are here to heal and support, but also to try to address unanswered questions related to the care of our patients through research and investigation."

written by Nancy Humphrey



## Congenital diarrhea program

**A**t 5 weeks old, Denny Majano wasn't gaining weight and, in fact, had lost 1 pound since birth. He suffered from severe, chronic diarrhea and tests failed to identify what was wrong.

He was admitted to Monroe Carell Jr. Children's Hospital at Vanderbilt in 2011 where he would spend almost 2 ½ years in the hospital, many times struggling to survive.

Denny is one of a rare group of infants born with having very loose, large-volume stools that occur multiple times a day. The diarrhea usually starts within the first two to four weeks of life, and if it persists, the infant can become dehydrated and will need to be hospitalized.

His case exemplifies what happens when basic science meets clinical care.

His care team took a step back to explore the bigger picture, bringing together Vanderbilt clinicians and basic research scientists to look at his genetic makeup with whole exome sequencing.

"He was really bad. He wasn't able to eat; he couldn't hold anything in his stomach. Everything he ate, he would throw up," said Denny's mother, Maribel Giron. "The doctors did one test after another and they came out OK."

He was ill enough that he wasn't able to meet his nutritional or fluid needs with eating and drinking by mouth, so for a long period of time he required hydration through an IV, said Denny's pediatric gastroenterologist Kelly Thomsen, MD, MSCI, assistant professor of Pediatrics in the D. Brent Polk Division of Gastroenterology, Hepatology and Nutrition at Children's Hospital.

When Sari Acra, MD, MPH, director of the division, conferred with Hernan Correa, MD, chief of Pathology at Children's Hospital, they noticed subtle changes in the epithelial (tissue) lining of the intestine that suggested abnormalities in epithelial development. They enlisted the help of James Goldenring, MD, PhD, Paul W. Sanger Professor of Experimental Surgery and co-director of the Epithelial Biology Center, an internationally recognized authority on intestinal epithelial biology.

Goldenring determined that some key nutrient transporters weren't making it to the intestinal cell lining. Recognizing the similarities to another rare form of congenital diarrhea he has characterized, Goldenring felt it was imperative that gene sequencing be performed on Denny. He used his own unrestricted research funds to make that happen.

The three physicians then conceived of a research study supported by the NIH-funded Digestive Disease research Center (DDRC) at Vanderbilt. In collaboration with the HudsonAlpha Institute, they identified a gene mutation in Denny known as DGAT1 (Diacylglycerol O-Acyltransferase 1), an enzyme that catalyzes the formation of triglycerides in the



ERIN O. SMITH

*Denny Majano, 8, is thriving after doctors discovered an extremely low-fat diet would help his rare disorder.*

intestine. The team has also helped diagnose genetic mutations in two other children with rare diseases.

The abnormal enzyme function in Denny can lead to profound diarrhea, and the team is now investigating how that causes abnormalities in the delivery of nutrient transporters to the intestinal lining. The team found only two other published cases, and three suspected cases in the world, with Denny's specific mutation.

Following the discovery of the mutation in May 2015, Denny, then 3 years old, was placed on an extremely low-fat diet. By the next day he was already better. He started gaining weight, and the distended abdomen he lived with for the first years of life, began to disappear. Denny, now 8, was weaned off nutritional assistance within eight weeks of starting the new diet. He is now thriving.

Acra said that most cases of congenital diarrhea are very difficult to diagnose.

"There may be 50 known causes and it's very difficult for the clinician to figure out which one is the cause of a specific

case. Some have treatments. Some don't. Sometimes it takes years to figure it out through genetic testing that's not readily available in a clinical lab.

"In Denny's case, can you imagine the cost of being in the hospital for two and one-half years? But once we figured out the cause, the solution in his case was relatively easy, and he was out of here in eight weeks with no need for nutritional support."

Children's Hospital is now a founding partner in an NIH-funded research consortium with three other medical centers — UCLA, Boston Children's and Toronto Sick Children's — studying the epithelial biology of congenital diarrhea and other diseases with an epithelial connection. They are collecting tissue from biopsies to help with the research.

"We're trying to decipher all of these unknown disorders and help in the diagnosis and treatments," Acra said. "That's our goal. It's still a ways off, but it definitely wasn't going to happen with only one center."

## C. Diff

**C**lostridioides difficile (also known as C. diff) exists on surfaces all around us. Some people have the bacteria in their intestines and never have any symptoms.

The human body contains thousands of different types of bacteria — some good and some bad. But for more than 200,000 people a year, often after a course of antibiotics that kills off enough healthy bacteria, C. diff doesn't hide; in fact, after the antibiotics kill off the good bacteria, C. diff flexes its muscle, causing frequent diarrhea with loose watery stools, fever, abdominal tenderness or pain, loss of appetite and nausea. And one in five people will get it again. And again.

The bacteria is often spread in hospitals and nursing homes. You can become infected if you touch clothing, sheets or other surfaces that have come in contact with feces and then touch your mouth or nose. Older adults in health care facilities are most at risk, but the incidence in pediatric patients continues to rise. It's typically treated with the drug vancomycin, which can be expensive, not always covered by insurance and not always effective for preventing additional C. diff infections.

"The way that I explain it to patients in the clinic is, if you have a garden that's completely full of shrubbery, there's no room for weeds to cause trouble," said Maribeth Nicholson, MD, MPH, assistant professor of Pediatrics in the D. Brent Polk Division of Gastroenterology, Hepatology and Nutrition at Monroe Carell Jr. Children's Hospital at Vanderbilt. "That's how most of us exist day to day. But if you start plucking out some of the shrubbery and some of the other plants there, you now have a place where weeds can grow. I think of C. diff as one of those weeds."

"It used to be all patients who had this had an antibiotic



SUSAN URMY

*Caleb Hartoon, 10, is able to enjoy things he loves, like tree climbing and jokes, after fecal transplant surgery.*

history," Nicholson said. "But now patients are showing up without that, so we don't know if there was an infection that changed their microbiome or if there are things in the diet that seem to matter."

Caleb Hartoon, 10, of Ft. Campbell, Kentucky, was 4 when he started having constant diarrhea accompanied by a prolapsing rectum (the bottom part of his large intestine dropped outside his anus).

Caleb spent about 14 days at Vanderbilt on isolation precautions when he was first diagnosed with C. diff. "He was in a lot of pain and his rectum kept prolapsing," said his mom, Tanya Hartoon. "We stopped counting at 115 prolapses."

His bouts with C. diff after being released from the hospital continued and after multiple trips to Vanderbilt, in 2014, Tanya and Nicholson decided on a fecal microbiota transplant (FMT), advised for patients with recurrent C. diff infections over the standard treatment — vancomycin.

FMT began about seven years ago at Children's Hospital. To date, more than 20 of these transplants have been performed.



The concept is simple — you take stool from a healthy donor, give it to the patient sick with *C. diff* (usually through a colonoscopy), and it repopulates the patient's microbiome, replacing unhealthy bacteria with a healthy population.

The donors can either be family members who are tested and deemed healthy, or the stool can come from a stool bank where donors undergo extensive screening. In Caleb's case, his mom was his donor.

"It's an interesting conversation to have," Nicholson said. "But I haven't had a lot of families going through this who aren't interested in FMT. Most parents have Googled it before they come. They understand the reason and people feel like it feels more natural than additional courses of vancomycin."

FMT is also costly, because it's not standardized enough for FDA approval since one stool sample is different from another. "We'd like a manufactured product to work, because it would be a quicker FDA approval, but so far they haven't performed well enough," Nicholson said.

Caleb, recovered from his *C. diff* infection, loves sports and making others laugh. Tanya recalls the 14-day Children's Hospital stay when a physician was making rounds. Caleb had a self-inflating whoopee cushion that he hid under the blankets

before the doctor began rounds. He pressed it several times when the doctor began talking to the medical students accompanying him.

"After a few times, the doc was concerned and asked him if he was OK (seeing as he was admitted for prolapsing from diarrhea). He pulled out the whoopee cushion and showed it to the doc. Everyone got a good laugh at that one," Tanya said.

## Nausea Program

**W**hen Caramia Johnson was in the fifth grade, her fear of vomiting became all-consuming. She'd eat her favorite foods, like pizza, and convince herself she needed to throw up. But she wouldn't. At its worst, her mom, Meredith Freeman, would get calls twice a day from Caramia's school telling her that her daughter was nauseous and wanted to come home.

"It was completely irrational and controlled her life," Freeman said. "It interfered with the quality of her life. I tried to make her feel better, but in fact, I was enabling her," she said.

*With help of an innovative therapy, Caramia Johnson, 14, is able to overcome chronic nausea.*



DONN JONES

Caramia suffers from emetophobia, a phobia that causes an overwhelming anxiety about vomiting. It can present as a fear of vomiting in public, a fear of seeing vomit, or a fear of being nauseated. The fear is sometimes triggered by a prior negative experience with vomiting, and despite the nearly constant worry it might happen, most people with emetophobia rarely vomit.

In 2019 when Caramia's stomach issues began to affect her caloric intake, she was referred to Alexa Russell, MD, and Monroe Carell Jr. Children's Hospital at Vanderbilt's nausea program. Food sensitivities and ulcers were ruled out, and she soon began seeing Marcus Wild, a doctoral student in the Department of Psychological Sciences at Vanderbilt University, specializing in clinical psychology. Wild meets with every patient in the clinic, talking to them about the mind/body connection, guided imagery and breathing and relaxation techniques, helping empower them to minimize their symptoms.

"Most times when you have nausea, it's related to an illness and it goes away," said Russell, assistant professor of Pediatrics in the D. Brent Polk Division of Gastroenterology, Hepatology and Nutrition at Children's Hospital. "In the kids I treat, it doesn't go away with the resolution of an illness, and it can be hard to treat. You don't always know the cause and that's frustrating. I try to focus on the root cause, when we know it, but sometimes that doesn't really matter. What matters is how we can get them over the symptoms and break the cycle. I have different tools in my bucket that I can offer our patients. Most of the time when they get to me, medications have failed, and they've had testing that hasn't revealed the cause. A lot of our patients are worried that people don't believe them, because visibly they look fine and the tests that have been run on them are fine. We can customize something out of the box for them."

Besides those with emetophobia, patients treated in the nausea clinic include those with chemotherapy-related nausea, some with anxiety and stress, those who have nausea related to solid organ transplants, or those who have developed nausea from an eating disorder. "In this clinic, our goal here is to get kids back to where they were before," said Russell, who completed a fellowship in integrative medicine and who has suffered from nausea due to a chronic illness.

Caramia believes her phobia began when she threw up as a child at school, but her mom believes it was triggered by anxiety when the family moved from Lexington, Kentucky, to Nashville, and continues to be triggered by anxiety about other issues.

"She would practice the breathing exercises Marcus gave her at school when she felt good, so that when she didn't feel good, the breathing would remind her of those times she felt OK," Freeman said. Her phobia has gradually improved with treatment, but Russell is recommending desensitization for Caramia, and that's the next step.

For this technique, the now 14-year-old will be shown photographs of vomit for short periods of time, with the time increasing each time she is asked to look at the photos. "She'll decide when it's enough," her mom said.

## EoE program

At Liam Webster's 2-year-old checkup with his pediatrician in Chattanooga, Tennessee, his mom, Sarah, mentioned that he seemed to have a chronic cough at night and she had noticed that often, after eating a bite of sticky food like rice or bread, he'd cough to clear his throat.

It was one of those things that moms don't really think are an issue, but a gut instinct says to mention them anyway, just in case.

In Liam's case, it's a good thing she did.

After some testing, Liam was diagnosed with Eosinophilic esophagitis (EoE), a chronic, allergy-driven disease which is characterized by eosinophils (allergy cells) that build up in the lining of the esophagus, the tube that carries food from your mouth to your stomach. It's not life threatening, but if left untreated it can cause permanent damage to the esophagus. About one in 2,000 individuals in the U.S. has it, and the incidence appears to be increasing as food allergies also increase.

Girish Hiremath, MBBS, MPH, assistant professor of Pediatrics in the D. Brent Polk Division of Gastroenterology, Hepatology and Nutrition at Monroe Carell Jr. Children's Hospital at Vanderbilt, is an expert on esophageal disorders, including EoE. "It can be a pretty nasty disease. We've only known about EoE for about 25 years. We're beginning to understand more about the disease," Hiremath said, adding that about 200-300 patients with the disease are treated at Children's Hospital.

After being diagnosed with asthma by his pediatrician, undergoing allergy testing, then receiving the EoE diagnosis from a gastroenterologist, Liam, now 9, was referred to Hiremath when he was 3. At the time, Children's Hospital was just beginning its EoE clinic.

Children who have EoE exhibit a variety of symptoms, so sometimes it's hard to diagnose, Hiremath said. Younger children can have non-specific symptoms like vomiting or refusing to drink milk. School-age children often have belly or chest pain. "Teenagers will often come to the emergency room with food stuck in their esophagus," Hiremath said. "They'll need an emergency endoscopy to take it out, and if the esophagus closes, we have to go in and put in a balloon to dilate so they can eat again."

Many patients with EoE also experience gastroesophageal reflux disease (GERD), a chronic digestive disorder that is caused by abnormal flow of gastric acid from the stomach into the esophagus. It's not uncommon for a patient undergoing treatment for EoE to also be treated for GERD.





*After much trial and error with food elimination and medication, Liam Webster, 9, is able to control his chronic, allergy-driven disease, Eosinophilic esophagitis.*

“Liam didn’t have any pain or stomach bloating. His was an unusual presentation,” Sarah said.

Hiremath said after a diagnosis, parents are hopeful that just one food can be taken away and their child will be fine, but in most cases it’s a combination of foods causing the EoE and finding out is done by trial and error.


After seeing Hiremath, Liam was put on an elimination diet for soy, dairy and peanuts to rule them out as being possible culprits. Hiremath said that treatments in younger children begin with avoiding the most common foods — dairy, egg, soy and wheat — in a systematic manner.

For Liam, peanuts and soy were added back in and dairy eliminated, but a biopsy through endoscopy still showed 10 eosinophils. EoE patients undergo anywhere between two to four endoscopies a year to keep track of their disease, Hiremath said.

Liam’s family opted to try eliminating dairy and putting him on an aerosol steroid for EoE and Omeprazole, an acid blocker. Liam improved, but not to 100%, so they changed his medication to a “slurry mixture,” a locally acting steroid that Liam took mixed with applesauce two times a day.

The family chose not to put Liam on an extreme elimination diet. “We didn’t want to do that because of our family and our lifestyle. He was already feeling very different from other kids,” she said.

Hiremath said having a child with EoE can be hard on families, too. “Life can be burdensome. They can’t eat certain foods. They have to pack their own meals for school, and parents have to be careful about letting their child attend birthday parties and get-togethers.”

Liam, an active boy who loves to talk and play soccer, is doing very well, Sarah said. They have recently added dairy back into his diet while he continues with medication. “This was his choice,” his mom reports. “He’s loving ice cream and cheese.”  hope





Colton Haywood, 2



# face time

*Cleft and Craniofacial Program experts are champions  
for children with facial differences*

Three days after having his skull surgically reconstructed last year, Colton Haywood was upright and reaching for the colorful toys attached to his stand-and-play activity center.

The unexpectedly rapid recovery didn't surprise his parents, who marvel at their young son's spirit and determination.

"From the point when my water broke at 19 weeks and the doctors said he would probably be (in a vegetative state) to now...he runs; he plays; he gets into everything," says Colton's mother, Erin Haywood. "He's such a blessing. We've gone from no hope to hope."

written by Leigh MacMillan  
photograph by Donn Jones

# Colton, who turned 2 in March, was born at 27 weeks' gestation.

Prenatal ultrasounds had not revealed that the left side of his skull and face did not fully develop, a condition called craniofacial microsomia. He had a cleft lip and palate (a split in the upper lip and roof of the mouth), malformation of the left eye and eyelids, a missing left ear and part of the jaw, and craniosynostosis — an abnormal fusion of the skull growth plates which can restrict brain growth.

A team of specialists in the Cleft and Craniofacial Program at Monroe Carell Jr. Children's Hospital at Vanderbilt has cared for the Gallatin, Tennessee, toddler since his birth.

At three months, he had a tracheostomy and gastrostomy tube inserted. He's had multiple surgeries to repair the cleft lip and palate, a bilateral hernia and the craniosynostosis.

"Vanderbilt has been absolutely perfect with us, helping us walk through every step that he's had to go through," Erin Haywood says. "It's been crazy. There were so many times that we didn't think he was going to make it."

But then Colton would bounce back quickly following a surgery, she says. "He's come through so much. Yes, he has some limitations, but you can't tell him that. If he sees everybody else doing something, he wants to do it too."

## A team of experts

The Vanderbilt Cleft and Craniofacial Program uses a multidisciplinary team approach to care for children with facial differences including cleft lip and palate and other craniofacial disorders.

"Our overarching goal is to have a unified program that leverages the complementary strengths of all the different specialists who take care of these kiddos," says Michael Golinko, MD, medical director of the Cleft and Craniofacial Program and chief of Pediatric Plastic Surgery. "That's plastic surgery, otolaryngology, head and neck surgery, neurosurgery, oral and maxillofacial surgery, hearing and speech, genetics, dental and more ... it's many different kinds of clinicians. At Vanderbilt, we have the advantage of having an integrated team in the same building on the same campus."

Golinko, who is also assistant professor of Plastic Surgery, sits on the edge of the seat in his Children's Hospital office. He talks fast and rapidly clicks from one slide to the next on his computer screen, describing patients he has treated to illustrate the types of patients the program serves. The patients range from those with cleft lip and palate — alone or in combination — to skull and jaw abnormalities to skull and facial trauma from dog bites, bullet wounds and crush injuries.

The bookshelves in Golinko's office contain 3D models of patient skulls, which are produced from computed tomography (CT) imaging for every patient who has a skeletal abnormality.

He picks up one of the models. The skull looks like it has been stretched out on one side.

"This patient has a lipofibromatosis, which is an overgrowth of the soft tissue that is deforming the bone," Golinko says. "These kinds of complex abnormalities require a team of experts who can apply different principles to these unique surgical problems."

Vanderbilt's experts have been treating cleft and craniofacial disorders for more than 30 years. The program was founded by Emeritus Co-Director Kevin Kelly, MD, DDS, associate professor of Plastic Surgery, who continues to treat patients.

## Prenatal-to-prom

Golinko joined Children's Hospital as the program's director in 2018 with the goal of establishing it as a "destination program," he says. He has worked with cleft team co-director James Phillips, MD, program lead Clare Gargaro, PA-C, and nurse coordinator Laura West, LPN, to set up team clinics, where patients see their entire care team all in one day in one location.

The program has a "prenatal-to-prom" approach. The team begins planning treatment before patients are born when possible — if cleft or craniofacial anomalies are detected prenatally — and sees patients through all the surgical procedures and therapies they need into the high school years and young adulthood.

The team also has an annual meeting with families to plan for the year.

"We love the meeting, because you can sit with every doctor and learn what's going to happen for the year," says Colton's father, William Haywood.

"Vanderbilt has been absolutely perfect with us, helping us walk through every step that he's had to go through. It's been crazy. There were so many times that we didn't think he was going to make it."





*Michael Golinko, MD, uses a collection of 3D-printed skulls to show different types of cleft and craniofacial conditions.*

“And we love that they give us a book with all of the information, all the aftercare and everything, and later we can do our own research and know what to expect,” adds Erin Haywood. “That book makes everything easier.”

It was at their team meeting in June 2019 that the Haywoods learned that Colton’s frontal skull suture had fused too early and was putting pressure on his brain, a condition called craniosynostosis.

“Colton had been really fussy and throwing up, which wasn’t normal for him,” Erin Haywood says. “Dr. Golinko had a CT done that day and discovered that the suture had fused and there was so much pressure that it was starting to grow the ripples of his brain into the bone.”

For patients with craniosynostosis, surgery is required to expand the skull, relieve the intracranial pressure and allow the brain to grow, Golinko says. In babies as young as 10 weeks, surgeons can use an endoscopic approach to remove a strip of bone. The traditional surgery, which Colton had, is a cranial bone remodeling procedure that involves opening the skull bones and using absorbable polymer plates to create space between and connect the skull bones.

“That was a very, very difficult surgery,” Erin Haywood says. In addition to surgery for craniosynostosis, which was performed by Kelly, Colton has had cleft lip and cleft palate repair surgeries with Phillips, and he will require jaw reconstruction in the future. Despite multiple rounds of genetic analyses and other testing, no cause has been determined for Colton’s craniofacial microsomia.

“You want an answer, but then it’s also OK, because he’s perfect the way he is,” Erin Haywood says.

## Powerful tools

Most patients in the Cleft and Craniofacial Program are treated for a cleft (a split) in the lip, palate, or both. A cleft lip and/or palate happens when the tissues that form the lip or palate do not join completely during development because of genetic, environmental or unknown factors. It is the most common facial difference, occurring in about 1 in 700 live births.

On average, a child with a cleft lip and palate requires five or six surgeries, starting at 3 to 5 months of age through high school. Without repair, children would face additional challenges related to feeding, hearing, dental development, speech and self-image.

Vanderbilt is one of the few programs in the region that offers nasolabial molding (NAM), a non-surgical way to reshape the nose and mouth tissues before surgery in children with wide clefts. NAM uses a plastic plate similar to an orthodontic retainer to bring the gums together and align the dental arches.

“It looks very scary and intimidating but it’s been great. It’s amazing what it’s done,” says Ashley Anderson, whose son, Judah, had NAM therapy prior to surgery for a wide cleft lip and palate.

Judah, now 15 months old, was diagnosed in utero at a 20-week ultrasound with a cleft lip and palate. His parents, Ashley and David Anderson knew it was a possibility. David also was born with a bilateral cleft lip and palate, experiencing many surgeries and appointments as a child.

“We knew we would want a team of doctors that work together, and then we found out Vanderbilt had a team and had heard great things,” Ashley said.

Margaret Maclin, DMD, assistant professor of Clinical Oral & Maxillofacial Surgery, is a pediatric dentist in the program who works with children like Judah undergoing NAM.

“Dr. Maclin has been a huge boon to our program in providing this care,” Golinko says. “NAM is an extremely powerful tool that can potentially reduce the number of surgeries a child will need. We are definitely getting better results with NAM than without it.”

The team immediately assessed Judah following birth to understand the size and scope of his cleft lip and palate. He got his NAM at 2 weeks old, with the Andersons taking Judah weekly to see Maclin for NAM adjustments. He wore the device until he was 4 months old when he had his first surgery to repair his lip and nose. He has had a second surgery since.

Golinko and Phillips have prioritized having dental services integrated in the program because nearly all children with cleft and craniofacial disorders require dental and orthodontic treatments.

“Having a pediatric dentist as part of the group is the difference between a good cleft-craniofacial team and a great team,” Golinko says.



*David and Ashley Anderson, from Franklin, Tennessee, learned during a 20-week ultrasound that their son, Judah, would be born with a cleft lip and palate. The Children's Hospital's Cleft and Craniofacial Center team has cared for him since birth, employing innovative techniques and surgery to repair his lip and cleft palate. The photos above show Judah, now 15 months old, and the progression of his care.*

For Maclin, the progress that she sees with each patient is rewarding.

"When they look back through pictures and they say, 'Oh my gosh, we have made it so far,' that's my favorite. (The NAM) doesn't always decrease the number of surgeries but it makes the surgeries easier, from start to finish, if we can do this in the very beginning."

The Andersons have the full teams' support in Judah's journey.

"It's definitely a process, but you are never going to be

alone in the process. You're going to have a team of people who are fighting for your child. They're going to care for you, they're going to love you and walk this journey hand in hand with you every step of the way," David said.

The NAM procedure wasn't available when David was having his cleft lip and palate corrected as a child.

"I think this is going to make (Judah) stronger and make him a better person. I know my husband, David, is one of the strongest people I know," Ashley said.

Patients at Vanderbilt also benefit from access to specialists in Hearing and Speech Sciences, which has the highest ranked audiology and speech-language pathology graduate programs in the country, according to *U.S. News & World Report*.

"We have an extremely experienced team here that works with families on speech and hearing and feeding issues," Phillips says. "Patients work with providers from the Bill Wilkerson Center, one of the top hearing and speech institutions in the nation."



## A culture of caring

Golinko was a third-year medical student when he saw his first cleft lip surgery. He was hooked.

"I had always been drawn to pediatrics and surgery but seeing that operation put me on the pathway to cleft surgery," he says. "It was like magic. I didn't even understand what I was seeing, but there was obviously something really special about it...the kind of transformation that you can make in a couple of hours and the difference that can make in a child's life for years and decades to come."

At the Vanderbilt Cleft and Craniofacial Program, "we want to be champions for these children and their families," Golinko says.

"We understand how hard it is to get care and that these children are going to need multiple surgeries and therapists throughout their childhood and into early adulthood," adds Phillips.

Patients come from the entire Southeast, and Gargaro says the program works to build community among families and to connect them to supportive groups. In the future, the program hopes to offer fun days for the children and educational events for families.


"I can't think of anything that's more important or more rewarding than being able to provide reassurance to these families and help them feel like they have a home," Golinko says.



*The Haywood family*

Colton's parents have found that home. They know that Colton will require more surgeries, and they're confident that the Vanderbilt team will see them through his journey.

"They'll sit with us and answer every single question. They'll stop in if Colton's in the hospital for another reason to see how he's doing. You can tell they're really caring," says William Haywood.

Erin Haywood adds, "Everybody works together. It's like a perfect puzzle. Everybody fits together so well."  hope

## Improving outcomes, sharing results

Operate, innovate, educate.

It's a simple phrase that sums up the mission of the Vanderbilt Cleft and Craniofacial Program, says medical director Michael Golinko, MD.

"This is primarily a surgical program, so 'operate' refers to the variety of surgical procedures we perform, and it also includes all of the interventions or therapies that a child might need," Golinko says. "We want to operate — do everything that we do — with the highest quality, the best surgical metrics and the best patient and family experience. This drives us to 'innovate,' and then we 'educate' — we share our experiences and innovations with colleagues and with families."

As part of an academic medical center, the program has robust ongoing research projects and is committed to training the next generation of cleft and craniofacial surgeons and specialists.

The program maintains a large registry of patients to define and improve outcomes and is using surveys to study the family

experience with the multidisciplinary cleft and craniofacial team.

Hearing and Speech Sciences investigators are studying speech outcomes related to the different syndromes children have and the types of surgical repairs and additional speech-related surgeries they need, says James Phillips, MD, cleft team co-director and assistant professor of Otolaryngology – Head and Neck Surgery.

The program is also beginning a study of hearing bands — a soft headband containing a hearing aid that transmits vibrations to the inner ear — to address hearing loss from fluid in the middle ear.

"Children with clefts have inherent Eustachian tube dysfunction and end up getting a lot of fluid in their ears that require management with ear tubes or more advanced ear surgeries," Phillips says. "To minimize anesthesia, we usually wait until the palate repair surgery to put in ear tubes."

This approach, however, leaves children with muffled hearing until they have the

palate repair and ear tube surgery. The researchers will test if wearing a hearing band corrects the conductive hearing loss.

The program is also participating in a multi-center study using a special type of magnetic resonance imaging to study the effect of cranial vault remodeling for craniosynostosis on brain development.

"This will be the first study to look pre- and post-op to see how the white matter tracts in the brain are changing and normalizing with surgery," Golinko says.

Team members routinely attend national meetings to share research findings and learn the latest innovations from other centers.

"We bring back new information so that we are always providing state-of-the-art evidence-based compassionate care to our patients," Golinko says.

The Vanderbilt program is nationally accredited for meeting the American Cleft Palate-Craniofacial Association standards of care and is held accountable to national rules and regulations. — by Leigh MacMillan



*Having studied coronaviruses since 1984, Mark Denison, MD, had a wealth of knowledge when COVID-19 appeared.*

# Return on Investment

Mark Denison's 36 years of coronavirus research pays off

written by Christina Echegaray  
photograph by Donn Jones

**F**or the first 20 years of his research career, Mark Denison, MD, studied a virus that few of his colleagues considered important. He remembers hallway conversations that went something like: "You're a smart guy, Mark, why don't you study a different virus?"

Denison, director of the Division of Pediatric Infectious Diseases, was undeterred. He was interested in fundamental questions about virus biology, and his focus — mouse hepatitis virus — was a good model.

Plus, it was a coronavirus. At the time, it was known that coronaviruses that infected humans caused the common cold, and that other coronaviruses caused severe disease in animals. Denison and the handful of other researchers who studied this virus family through the 1980s and '90s thought that a coronavirus might someday cause severe disease in humans.

They were right.

In 2003, a coronavirus caused SARS (severe acute respiratory syndrome); another caused MERS (Middle East respiratory syndrome) in 2012; and a third caused this year's COVID-19 global pandemic.

Denison didn't set out to be a physician-scientist. He planned to be a general practice pediatrician, like his father. During his pediatrics residency at the University of Iowa, he got interested in infectious disease and thought it would be a useful addition to his practice, so he decided to complete fellowship training in the specialty.

"As I got into it clinically, I became very frustrated with the lack of answers to questions in infectious disease and how quickly it was changing, and I stepped into Stan Perlman's lab at Iowa just to see what the research process was like," he says. "I landed on this 'side project' he had looking at the biology of coronaviruses."

Studying mouse hepatitis virus, Denison and Perlman were the first to identify coronavirus proteins that were required for the virus to reproduce. Denison continued to study coronavirus replication during his first faculty appointment at Thomas Jefferson University in Philadelphia, and after he arrived at Vanderbilt in 1991.

Despite the relative lack of interest in coronaviruses from some of his colleagues, Denison found continuous funding support from the National Institutes of Health and philanthropic sources and made steady progress defining essential features of coronavirus biology.

"At the level of the NIH, there has always been a recognition that fundamental research in virology is important for truly understanding how viruses are unique and what functions they have that can become targets for interference," Denison says.

Using mouse hepatitis virus, and later the SARS and MERS coronaviruses, Denison and his team defined essential features of viral replication and pathogenesis. They discovered a novel proofreading mechanism that is active during replication and were the first to demonstrate that a compound from Gilead Sciences inhibited the replication of multiple coronaviruses.

That compound, remdesivir, received emergency approval from the Food and Drug Admin-



“...this may not be the last coronavirus. We’re doing the work for the current one, but we’re always planning for the next one.”

istration this spring as a treatment for patients who are severely ill with COVID-19.


With his 35-plus year history of contributions to understanding coronavirus biology, Denison is a sought-after source for journalists. He’s doing his best to help educate, he says, while also making sure that members of his research team stay healthy and rested. Working with dangerous viruses in a biosafety level 3 (BSL-3) laboratory requires “a level of vigilance and attention to detail that is physically and mentally exhausting.”

Denison relaxes by juggling, playing the tin whistle and en-

joying long Saturday evening dinner chats with his three adult children and their significant others, separated into the four corners of a large screened porch.

He and his research team continue to search for new antiviral compounds that might work even better than remdesivir; they’ve already identified several good candidates in collaboration with the Emory Institute for Drug Development. They are also exploring ways to attenuate coronaviruses — as a strategy for future vaccine development.

“I hope that a simpler vaccine strategy, like the ones we’re involved in testing now, will work,” Denison says. “But this may not be the last coronavirus. We’re doing the work for the current one, but we’re always planning for the next one.”

Denison is the Edward Claiborne Stahlman Professor of Pediatrics, professor of Pathology, Microbiology and Immunology, and director of the Lamb Center for Pediatric Research.  hope

## VUMC studies provide key positive results for COVID-19 vaccine in early-stage clinical trial

An experimental coronavirus vaccine stimulated robust immune responses against SARS-CoV-2, the virus that causes COVID-19, and raised no serious safety concerns in an early-stage clinical trial.

The vaccine, called mRNA-1273, was developed by Moderna Inc. in collaboration with the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health.

Early findings from the phase 1 clinical trial of the vaccine, published in the *New England Journal of Medicine*, support further development of mRNA-1273. A large phase 3 clinical trial began in August.

Vaccines and therapeutics are urgently needed to slow the unrelenting COVID-19 pandemic, which has sickened more than 25 million people worldwide and killed at least 858,436 as of Sept. 2.

The phase 1 trial of mRNA-1273 enrolled 45 healthy volunteers ages 18 to 55, who received two vaccinations 28 days apart. The interim report includes follow-up through day 57; participants will continue to be followed for one year after the second vaccination, with scheduled blood collections

to characterize immune responses.

The Vanderbilt University Medical Center research team led by coronavirus expert Mark Denison, MD, Edward Claiborne Stahlman Professor of Pediatrics and director of the Division of Pediatric Infectious Diseases, is a key contributor to the phase 1 trial testing. The researchers are analyzing the ability of antibodies in blood serum samples from trial participants to “neutralize” live SARS-CoV-2 and prevent the virus from infecting cultured cells.

“Our results show that the vaccine induces a robust neutralizing antibody response in healthy volunteers, which looks similar to responses in people who had COVID-19,” said Jim Chappell, MD, PhD, research associate professor of Pediatrics and director of the vaccine and antibody studies in the Denison laboratory. “This work, in conjunction with the results of other laboratory studies at the NIH and the acceptable safety outcomes among vaccine recipients, supports advancement of mRNA-1273 into a large phase 3 clinical trial.”

The phase 3 trial will evaluate the effectiveness of mRNA-1273 for the prevention of COVID-19, compared to no vaccine.

The mRNA-1273 vaccine uses genetic material (mRNA) encoding the SARS-CoV-2 spike protein — the protein that protrudes crown-like from the virus surface, giving coronaviruses their name. The spike protein

binds to receptors on human cells and enables virus entry. It is required for infection and is the target of many candidate SARS-CoV-2 vaccines.

The idea of the mRNA vaccine is for a person’s cells to use the mRNA instructions to produce spike protein and stimulate an immune response against it. Then, if the vaccinated person is exposed to SARS-CoV-2, their immune system should recognize and neutralize it to prevent infection.

If the mRNA vaccine technology is successful, it might become a routine way to quickly develop vaccines for any emerging viral threat.

The concept and design of the spike protein encoded in the Moderna vaccine was developed by Barney Graham, MD, PhD, a former Vanderbilt faculty member who is now deputy director of the NIAID Vaccine Research Center.

In addition to Denison and Chappell, team members participating in the studies of mRNA-1273 include Laura Stevens, MS, Andrea Pruijssers, PhD, Tia Hughes, MS, and Xiaotao Lu, MS. The studies at VUMC are supported by the NIAID (grant AI148684), the Vanderbilt Institute for Clinical and Translational Research directed by Gordon Bernard, MD (NIH grant TR002243) and the Dolly Parton COVID-19 Research Fund.

— by Leigh MacMillan

# pioneers hope

*At Monroe Carell Jr. Children's Hospital at Vanderbilt, our work extends beyond patient exam rooms. We are also searching for discoveries to offer better treatments, provide quality care and train the next generation of clinicians. The profiles here represent only a sampling of the tireless work performed daily to make Children's Hospital a place of unwavering hope. In each issue, we also include a profile to highlight our longstanding partnership with our community pediatricians who help ensure all children receive the best care each and every day.*

**Molly Hood, MD, FAAP**, had every intention of practicing internal medicine and caring for adults until a pediatrics rotation near the end of her third year of medical school at the University of Tennessee. She quickly changed her career track.

Hood's father was a general surgeon who later completed a second residency and became a radiologist practicing at Southern Hills Medical Center in Nashville. Her mother was a nurse who taught nursing students at Morehead State University in Kentucky. Between the two, she was constantly surrounded by medicine growing up. But becoming a doctor, and especially a pediatrician, was not something she was drawn to early on. Now, she can't imagine any other career.

"I did my peds rotation and absolutely loved it," she said. "Then I decided to do a combined internal medicine/pediatrics residency. By the end of my residency, I realized I enjoyed pediatrics much more. You have such an ability to make a real impact in lifelong health during the early years of life as opposed to taking care of problems that already exist in internal medicine in adults."

Hood served as pediatric chief resident at LeBonheur Children's Hospital and practiced pediatrics in Memphis, Tennessee, before joining Pediatric Associates of Franklin in 2005. The Williamson County practice has cared for families for more than 40 years and has been voted "Best Pediatric Practice" for 20 years by readers of *Williamson Parent Magazine*.

As a graduate of Brentwood High School, Hood was returning to familiar surroundings, but she credits her mentors at the practice, Ray McNeeley, MD, and Scott Brooks, MD, for helping her find secure footing in private medical practice.

"I had a lot to learn," Hood said. "Back then, most of your residency training was inpatient, where you learned how to care for hospitalized patients. You have some clinic exposure, but it's not the day-to-day life of a private practice by any means. They were big influences for me here, in everything from how to actually manage a practice to how to best care for both patients and their families."



Another huge support has been her practice's close connection with specialists at Monroe Carell Jr. Children's Hospital at Vanderbilt who are always available to answer her questions or help manage patients' more complex care. And the resources of the Cumberland Pediatric Foundation, a nonprofit company that supports scientific, charitable and educational needs of

pediatric practice members, have been especially invaluable, she added. Today, Hood serves as vice president of the foundation.

"The Cumberland Pediatric Foundation is a way to make great personal connections with both specialists at Vanderbilt and with other area pediatricians," she said. "It really helps provide a great sense of community."

Hood credits a patient's family with connecting her to a specialty close to her heart, caring for children with Down syndrome. Hood became friends with the family as she provided care for their first child who has Down syndrome. She soon joined the mother's efforts to bring a Gigi's Playhouse to Middle Tennessee. Gigi's Playhouse, which originated in Chicago, provides free educational and therapeutic programs to individuals with Down syndrome from birth through adulthood. In 2013, Gigi's Playhouse opened in the Cool Springs area of Williamson County, less than a mile from Pediatrics Associates of Franklin.

"I served on the board there for several years," Hood said. "Now, our Gigi's Playhouse is thriving and is just a wonderful place."

When she's not caring for patients, Hood is busy planning her next hiking excursion. She's enjoyed the winding trails of the Grand Canyon and been awestruck by the vivid, quaking aspens of Rocky Mountain National Park in autumn. But she's just as content at nearby treasures such as Radnor Lake and Percy Warner Park.

"I'd go hiking every single day if I could," she said. "I still have a lot of places on my list I want to go."

— by Jill Clendenning



**Frank Fish, MD**, is a highly sought interventional cardiologist at Monroe Carell Jr. Children's Hospital at Vanderbilt who specializes in correcting abnormal heart rhythms, using a procedure called cardiac ablation.

He treats children and adolescents, as well as adults who acquire arrhythmias as a delayed consequence of surgical correction for congenital heart defects, performed in their childhood.

"My three things are running, music and my job," said Fish, professor of Pediatrics and Medicine at Vanderbilt University Medical Center, whose main instrument these days is bass guitar. He also plays upright bass, bassoon, saxophone, a bit of piano and some guitar.

Growing up on the south side of Indianapolis, school sports and marching bands meant everything. Fish played bassoon and ran cross country for his high school.

"I knew they needed a bassoon player in the school orchestra, so I made a deal with the band director. I told him 'I'll play the bassoon, and I promise I'll play it well, if you let me out of marching band so I can run cross country.'" His bassoon playing attracted college scholarship offers but Fish also had

longstanding interests in math and science and chose to study chemical engineering and biology.

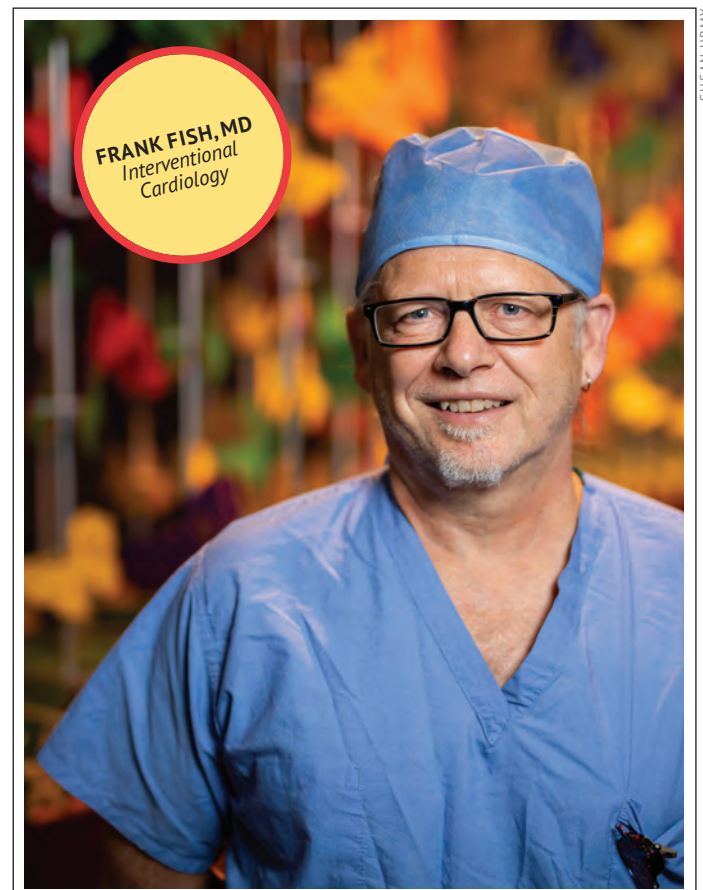
He wound up in medical school by accident, he says. "A friend suggested, 'Hey, maybe you should take the MCAT [Medical College Admission Test] and just see how you do' ... somehow I found myself sitting in first-year medical school."

He questioned the choice for years, but that changed in the 1990s with the rise of cardiac ablation.

Through a blood vessel in the groin or neck the cardiologist threads an electrode into the heart, precisely positioning the tip at the interior heart wall and using radio frequency energy to selectively scar or destroy small bits of troublesome tissue and thereby restore normal heart rhythms. At VUMC, Fish was part of the team that performed the first cardiac ablation in Tennessee, on Jan. 6, 1992. As the clinical program took off for adults and later for children, he found his profession.

"It seemed to be something well-suited to the way my brain works, something that came fairly easily and naturally to me," said Fish, who sees parallels between music performance and the ablation procedure. "I decided, well, this is something that makes good use of my nature, if you will."

Fish keeps a bass guitar in his office in the Doctors' Office



SUSAN URMY



Tower at Children's Hospital. He continues to play jazz, blues and rock in various local ensembles. And he's still a runner. He and his wife, retired neonatologist (and oboist) Wendy Fish, MD, have two children — Hannah, a physician who this summer embarks on cardiology training at VUMC, and Emily, who teaches seventh grade in Rutherford County, Tennessee.

— by Paul Govern



**Sarah Tolan, BSN, RN**, has a devotion to her young patients that is all-encompassing. As a nurse in the Pediatric Cardiovascular Intensive Care Unit (PCICU), she cares for the families of children who undergo multiple surgeries to repair congenital heart defects.

In one such case, 4-year-old Toby Williams' expected 2-week stay in the hospital for open heart surgery stretched into 338 days, characterized by one complication after another. Every day Tolan worked, she was at his bedside, learning about and caring for him as complications mounted. Her work was recently recognized with a DAISY Award, which recognizes nurses for exceptionally compassionate care.

Tolan was "the face he looked forward to seeing, the smile

and voice he knew he could count on, even when he couldn't smile or talk in return," Toby's mom, Amanda Williams, wrote in nominating Sarah for the award. "She changed thousands of diapers, gave hundreds of Lovanox shots, got him up and out of bed no matter the extra time or effort it took. She took him on wagon rides, washed his hair, played Play-Doh, and held his hand while he endured yet another wound vac change. She sang songs and wore silly hats and told him he was strong and brave."

For Tolan, it's just another day on the job. "I just like helping people, being on my feet and always thinking. I have a pretty sunny disposition in general, which I think sometimes helps. You have to be really creative to be a nurse. I think you use every skill you've acquired throughout your life as a bedside nurse."

Tolan is passionate about her specialty, the PCICU, but she came into it almost by accident. During high school in her hometown of Gulf Breeze, Florida, she decided she wanted to be a nurse, but had no idea of the area in which she would specialize. In her junior year of nursing school at the University of Mississippi, she applied for an externship that — to her surprise — placed her in a PCICU.

"At the time I didn't know much about congenital heart defects and the surgeries required, so I initially thought, 'that's going to be so boring,'" she said. "I was in there for not even a week and I thought, this is fascinating."

Knowing VUMC's reputation for excellence, Tolan applied for the competitive nurse residency program, fully expecting not to be accepted. She had enjoyed visiting Nashville with her family when Ole Miss football played Vanderbilt University. If she was accepted, she specified the CVICU was where she wanted to be.

Tolan was accepted in the yearlong program and started in the PCICU; the nurse residency cohort that she started with is still at VUMC, nearly four years later.

When she's not treating patients, Tolan loves traveling, tennis, indoor cycling and, most of all, going to the beach. But her patients are never far from her mind.

"Every patient shapes me in some way as a nurse and as a human being," she said. "It's really easy to make this job, these patients, these families, your whole life. It's a whole lot more difficult for it to just be part of your life. Because they just grab at your heart and they fight so much. These kids, they beat the odds."

— by Matt Batchelder



**Irving J. Zamora, MD, MPH**, says his earliest memories of wanting to be a doctor come from middle school, but his parents say that dream started much earlier.

One year before Zamora was born, his parents were involved



SUSAN URMY

in a car accident, breaking the majority of his mother's lower spine and leaving her in a full-body cast. She remained in that cast through Zamora's birth.

"My mom says that as early as she can remember, I would always say I wanted to be a doctor because I wanted to 'fix' her," said Zamora, now a pediatric surgeon specializing in minimally invasive surgeries at Monroe Carell Jr. Children's Hospital at Vanderbilt.

He attributes his successes to an "aligning of the stars," acknowledging his road to pediatric medicine was anything but traditional.

A native of Nicaragua, Zamora moved with his family to the United States when he was 5 seeking political asylum from a civil war. With dreams of becoming a paramedic, he attended a vocational technical high school in inner city Miami, Florida, to complete first responder training as an EMT and volunteer firefighter.

"With all the time I spent on ambulances, that's when I remember becoming more excited about being on the other side of the health care delivery tree. When we dropped patients off at the emergency room, I always wanted to figure out what else was going on with them," said Zamora.

Zamora was valedictorian of his class and became the first person from his high school to head off to an Ivy League college — Cornell University — thanks to the help of scholarships and the timely receipt of his green card. He continued his work as a volunteer firefighter and became a resident assistant at Cornell to help supplement his college housing.

Rotations in global health led him to practice in Spain, Africa and China, but it wasn't until an eight-week preceptorship at Texas Children's Hospital during the summer between his junior and senior year that he discovered his dream of becoming a pediatric surgeon.

"Pediatric surgeons have a huge breadth of practice. We take care of congenital diseases, cancer, trauma, acute surgical problems and benign conditions requiring elective operations. We see everything from fetal patients before they're born to the youngest of neonates when they're only 24 weeks and weigh less than 1,000 grams. I also operated on a 28-year-old patient the other day. We span the early lifetime," said Zamora.

"We like to say, 'We don't save lives, we save lifetimes.' That's one thing I love about pediatric surgery — you're able to affect someone's life so early."

Zamora was recruited to Children's Hospital in October 2019 to help build a minimally invasive surgery program, allowing major surgical operations to be performed through tiny incisions. He believes that's where the future of pediatric surgery is headed, and research spearheaded through the new program will examine the approach's outcomes and ways to improve surgical techniques. Recently, he was named as director of Advanced Minimally Invasive Surgery at Children's Hospital.

ERIN O. SMITH



In addition to bringing surgical diversity and training to Children's Hospital, Zamora is proud to bring his cultural background, which helps him connect with Nashville's growing Spanish-speaking population.

"As our country continues to attract people from all over the world, having surgeons and doctors who look a little more like you is a big deal. I take that responsibility with pride, knowing I represent not just myself and my family, but a community of Latin Americans in the United States and lots of children who want to become doctors and surgeons," said Zamora. "Other young people are seeing me, and I hope it makes them think, 'If he can do it, maybe I can too.'"

Outside of work, Zamora enjoys spending time outdoors with his wife, Lindsey, an assistant professor of Clinical Obstetrics and Gynecology at Vanderbilt, and their two daughters, ages 1 and 3. His hobbies span from salsa dancing and playing percussion to water sports and soccer.

— by Kelsey Herbers





Alice, left, and Olivia Reed inspired a gift to Monroe Carell Jr. Children's Hospital at Vanderbilt.

## Reed family gives back

**B**renda Reed and her husband, Colin, chair and CEO of Ryman Hospitality Properties, are thankful they get to watch their two curious, blue-eyed, 4-year-old twin granddaughters, Olivia and Alice Reed, grow up.

The Reed family recently made a transformative philanthropic gift to Monroe Carell Jr. Children's Hospital at Vanderbilt to support a fetal clinic space and help other families and newborns, like Olivia and Alice, who need maternal-fetal care for high-risk in utero conditions and pregnancies.

Olivia and Alice Reed only had about a 50% chance of being born alive after their parents, Nicole and Edward, learned at a 12-week ultrasound that the girls had a rare condition — they were monoamniotic-monochorionic (mono mono) twins.

Mono mono twins occur in about one in 10,000 births and in only about 1% of identical twin pregnancies. In these cases, the twins share the same

amniotic sac and placenta, which leaves the infants at a high risk for cord entanglement, cord compression, twin-to-twin transfusion syndrome and premature birth. Children's Hospital is a premier destination facility for high-risk in utero cases like the Reeds'.

With the help of Children's Hospital specialists including Kelly Bennett, MD, MSc, the twins were born at 29 weeks' gestation in July 2016, staying in the hospital's Neonatal Intensive Care Unit (NICU) for seven weeks. Today, they are thriving.

Vanderbilt also was part of bringing the Reeds' newest family member into the world: Katherine Hannah Reed, the twins' cousin, was born at Vanderbilt in May to Micaela and Sam Reed.

Using the Reed family's gift, Children's Hospital will open a new advanced maternal-fetal clinic and continue to enhance and grow specialty care services for women with high-risk pregnancies.

"We are eternally grateful to the team of doctors, nurses and staff for the care they provided to Nicole and the twins, Olivia and Alice, all the way through," said Brenda and Colin Reed, who are also members of the Children's Hospital Advisory Board. "Our entire family wanted to show our appreciation to Children's Hospital while supporting the continued achievements of the fetal medicine team so other families can have the same chance to watch their children grow up."

The new clinic will be built out and located on the ninth floor of Children's Hospital as part of the Growing to New Heights expansion, a philanthropic endeavor that added four new floors atop the hospital and advanced the size and scope of existing programs.

"Childbearing families yearn to feel deeply cared about, and this is never more true than when faced with a potentially devastating fetal diagnosis," said Bennett, director of the Division of Maternal-Fetal Medicine and director of the Fetal Center at Vanderbilt. "This generous gift from the Reed family will enable us to create a physical space that helps us restore hope and map out a way forward. Within a beautifully family-centered space, our team will ensure that patients feel empowered, informed and confident during a most vulnerable period."

With an experienced team of experts in maternal-fetal medicine, neonatology and pediatric surgery, Children's Hospital specialists care for expectant mothers and babies at risk for or born with congenital birth defects or abnormalities. Among the many conditions treated are congenital heart defects, spina bifida, pulmonary airway malformations and more. Children's Hospital specialists collaborate with obstetrics experts at Vanderbilt University Medical Center to provide the most complete and convenient care for both the mother and her unborn child.

— by Christina Echegaray

## Gift supports new telemedicine space

The 11th floor of Monroe Carell Jr. Children's Hospital at Vanderbilt opened in March, debuting a new space dedicated to the hospital's state-of-the-art telemedicine technology. These facilities, funded by and named in honor of Laura Jo and Wayne Dugas, the Cal Turner Family Foundation and the James Stephen Turner Family Foundation, include a telemedicine-enabled conference room that converts into a classroom and clinician workstations. The space came online at a crucial time, as the COVID-19 pandemic hit soon after the opening.

Telemedicine has been a critical piece of Vanderbilt University Medical Center's response to COVID-19, with over 250 children's visits a day across more than 20 specialties. The ability to bring expertise to patients remotely has been vital in mitigating the spread of the virus.



ERIN O. SMITH

Merrill Stoppelbein, MSN, NP, uses the new telemedicine space for a patient visit.

Children's Hospital's school-based telemedicine program in Allen County, Kentucky, also funded by the Turner and Dugas families, served as a foundation for this initiative, preparing the hospital to move rapidly to telemedicine appointments when the pandemic hit. This program connects school nurses within the county to nurse practitioners and pediatricians at Children's Hospital,

making care available to students who have certain conditions typically requiring a trip to a doctor's office.

The vision of the Turner and Dugas families has long been helping underserved communities. This new technology furthers that mission by enhancing health care access to all patients, no matter where they live.

— by Paige Turner

## Stand with Us

The Nashville Predators hockey team, longtime supporters of Monroe Carell Jr. Children's Hospital at Vanderbilt, showed their support for health care workers by donating 600 Chick-fil-A meals and 600 Frothy Monkey meals to feed hospital employees during the COVID-19 pandemic.

As part of the Predators' "Eat with Us" initiative to support heroes battling the global pandemic, the meals were made possible through the Predators' 365 Pediatric Cancer Fund, created by goaltender Pekka Rinne and former Predators captain Shea Weber.

Predators players Rinne, Matt Duchene, Ryan Johansen and Roman Josi also teamed up with Dunkin' to provide coffee for health care providers working on the front lines.

And while the Predators, who typically make frequent patient visits, couldn't physically be at the hospital because of social distancing precautions, they still found ways to spread joy to patients. Made possible with technology in



DONN JONES

Nashville Predators' mascot Gnash helped unload donated meals to feed hospital employees during the COVID-19 pandemic.

Seacrest Studio, players Rinne, Kyle Turris and Austin Watson all virtually visited with patients and families at Children's Hospital. — by Paige Turner



### Reducing stress in parents of children with autism

Early behavioral intervention — often delivered by parents — appears to improve outcomes for children with autism spectrum disorder (ASD). Studies show, however, that the parents are experiencing high levels of psychological stress. Mindfulness-based stress reduction (MBSR), which can reduce stress and improve sleep, health and life satisfaction, may be useful for parents of children with ASD.

Amy Weitlauf, PhD, and colleagues conducted a pilot study to compare the parent-implemented Early Start Denver Model (P-ESDM) alone or with added MBSR. In a randomized controlled trial of children younger than 36 months with ASD and their caregivers, the investigators found that parents who received MBSR plus P-ESDM had greater improvements in parental distress and parent-child dysfunctional interactions than parents receiving P-ESDM only.

The results, reported in the April issue of *Pediatrics*, suggest that stress-reduction strategies may be beneficial for parents of children with ASD and have implications for care systems that use parent-delivered interventions.

This research was supported by the Health Resources and Services Administration and Maternal and Child Health Bureau with core support from the National Institutes of Health (grant HD008321).

— by Leigh MacMillan

### Biomarker in saliva predicts childhood obesity: study

A molecular marker in saliva is associated with the emergence of childhood obesity in a group of preschool-age Hispanic children, according to a new report the journal *BMC Medical Genetics*.

The findings supports ongoing efforts to identify biomarkers associated with the emergence of childhood obesity before body mass index (BMI) is designated as obese, said Shari Barkin, MD, MSHS, director of Pediatric Obesity Research, William K. Warren Foundation Professor of Medicine and chief of the Division of General Pediatrics at Monroe Carell Jr. Children's Hospital at Vanderbilt.

The prevalence of pediatric obesity has been increasing at an alarming rate, with a disproportionate burden in Hispanic populations.

Barkin and her colleagues collected saliva samples at baseline from children who were enrolled in the Growing Right Onto Wellness (GROW) trial. A total of 610 parent-preschool child pairs, 90% of whom were Hispanic, received high-dose behavioral intervention during a three-year study period. At enrollment, the children were at-risk for obesity, but not yet obese.

Even with interventions to improve nutrition, physical activity and sleep, 30% of the children emerged as obese.

The investigators collected saliva as an easily accessible, non-invasive tissue that they hoped would reveal genetic and epigenetic factors that might predispose a child to obesity.

In a previous study, they analyzed saliva samples from a subset of the enrolled children for methylation of genes associated with obesity. Methylation is an epigenetic “mark” on DNA that regulates gene expression. They found that methylation at 17 DNA sites in the child's baseline saliva was associated with the mother's BMI and waist circumference, suggesting that obesity risk may be transmitted from mother to child.

In the newest study, investigators found that methylation of a gene called NRF1, which has roles in adipose tissue inflammation, was associated with childhood obesity. A child with the NRF1 methylation at baseline had a threefold increased odds of being obese three years later, after controlling for maternal BMI and other factors.

Other authors of the current study included Amanda Rushing, Evan Sommer, Shilin Zhao, PhD, and Eli Po'e. This research was supported by grants from the National Institutes of Health (HL103620, DK092986, TR000445).

— by Leigh MacMillan

### Clues to lung injury in preterm babies

Bronchopulmonary dysplasia (BPD) — a form of chronic lung disease — is a leading complication of preterm birth affecting infants born before 32 weeks gestation. Exposure to high levels of oxygen (hyperoxia) plays a role in BPD pathogenesis, but the precise molecular mechanisms remain uncertain.

Jennifer Sucre, MD, and colleagues previously demonstrated a pattern of increased Wnt signaling in human BPD tissue and hyperoxia models of BPD. They have now used three different model systems — 3D human organoids, mouse lung slices and a mouse in vivo model — to define mediators of activated Wnt signaling after hyperoxia injury.

They discovered that increased expression of Wnt5A in lung connective tissue cells contributes to the impaired alveolarization (alveoli are the sites of gas exchange) and septal thickening observed in BPD.

The findings, reported in the *American Journal of Respiratory and Critical Care Medicine*, suggest that precise targeting of Wnt5A in the lungs of preterm infants may prevent or reverse BPD.

This research was supported by the National Institutes of Health grants, Department of Veterans Affairs, Francis Family Foundation and Julia Carell Stadler Chair in Pediatrics.

— by Leigh MacMillan

# A Lifesaving Gift



Essentially born with half of a heart, Nadia had five open-heart surgeries before the age of 3 and ultimately received a transplant. Today, Nadia is a healthy, happy 10-year-old who is full of personality and thankful for her gift of life.

Help us ensure this lifesaving care continues for years to come by supporting Monroe Carell Jr. Children's Hospital at Vanderbilt.



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## Ranked among the nation's best

For the 14th consecutive year, Monroe Carell Jr. Children's Hospital at Vanderbilt has been named among the nation's Best Children's Hospitals in *U.S. News & World Report's* annual rankings. Children's Hospital, a regional comprehensive pediatric care center, achieved national rankings for 10 out of 10 pediatric specialty programs.