

**LOVE WILL  
FIND ANSWERS.**

Children's Mercy

Tamora Lewis, MD  
Neonatology  
Pediatric  
Clinical Pharmacology

**Research** .....  
**Impact Report**



**Children's Mercy**

LOVE WILL.



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## Thank you for fueling answers for waiting children and families.

There has never been a more exciting time for research at Children's Mercy. We are resolute in our mission to bring hope and healing to our region's children. We do that through world-class clinical care, and through a commitment to research that will bring the cures of tomorrow.

We're investing in research across all clinical areas – from heart disease to hematology and beyond. It is imperative to us that this research quickly moves from bench discoveries to bedside treatments. Our priority is research that will quickly translate to direct patient care improvements for the children we serve.

As you survey our research impact, you'll find a common thread – **our quest to lead precision medicine for kids.**

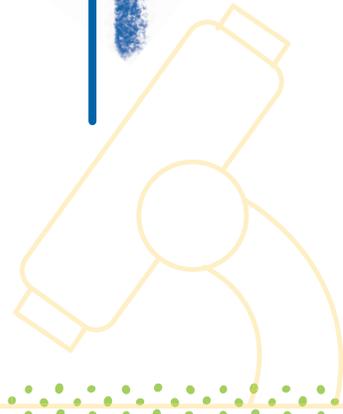
There are three areas that are key to our precision medicine success, and it just so happens that because of you, Children's Mercy is among the world's leaders in these three areas:

- Genomics
- Precision Therapeutics
- Pediatric Bioethics

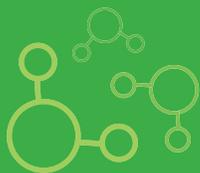
Donors like you have made this world-class work possible. Thank you for partnering with us to target the causes and develop cures for pediatric diseases.

Your support will find answers to give children and families hope.

With gratitude,  
Tom Curran, PhD, FRS  
Executive Director and Chief Scientific Officer  
Children's Research Institute  
Donald J. Hall Eminent Scholar in Pediatric Research



# Genomics



## Decoding Jaden's Genetic Puzzle

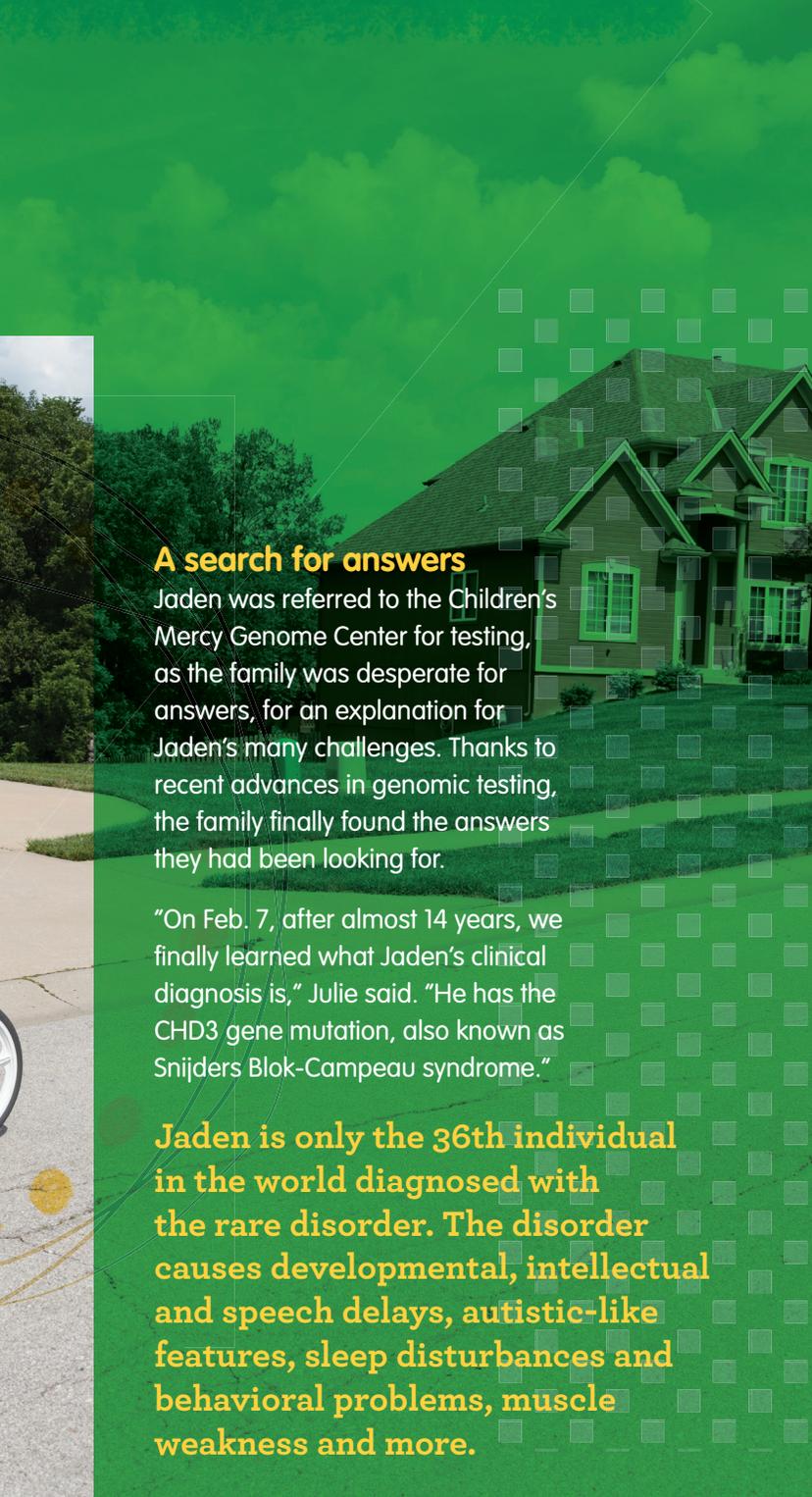
Jaden York's life has been a puzzle since the moment he was born on March 31, 2005. His mom, Julie, quickly realized something was wrong and requested a referral to a developmental pediatrician at Children's Mercy when he was 2 months old. By 4 months old, the doctor confirmed that Jaden had developmental delays. Julie promptly enrolled him in physical, occupational, speech, vision and water therapies.

"Jaden screamed through every therapy," Julie said. "He didn't walk until he was about 3 years old, and he still wasn't talking when he started kindergarten, despite daily therapies."

As Jaden grew, his behavior became more challenging. Doctors prescribed one medicine after another, medicines often used to help with issues such as ADHD, aggression and sleep disturbances—only those medicines didn't help.

"We tried everything, but nothing seemed to work," Julie said. "Some medicines would make him worse and some didn't do anything. We were constantly in and out of the hospital. I joked that it was my home away from home."





### **A search for answers**

Jaden was referred to the Children's Mercy Genome Center for testing, as the family was desperate for answers, for an explanation for Jaden's many challenges. Thanks to recent advances in genomic testing, the family finally found the answers they had been looking for.

"On Feb. 7, after almost 14 years, we finally learned what Jaden's clinical diagnosis is," Julie said. "He has the CHD3 gene mutation, also known as Snijders Blok-Campeau syndrome."

**Jaden is only the 36th individual in the world diagnosed with the rare disorder. The disorder causes developmental, intellectual and speech delays, autistic-like features, sleep disturbances and behavioral problems, muscle weakness and more.**

## **Our World-class Center for Pediatric Genomic Medicine**

Thanks to significant donor support, Children's Mercy became a global leader in pediatric genomic medicine seven years ago when our researchers reported a proof-of-concept process called STAT-Seq, which used whole genome sequencing to diagnose critically ill infants within 50 hours. Before STAT-Seq, testing even a single gene took six weeks or longer. The innovation was recognized as one of TIME magazine's Top 10 Medical Breakthroughs of 2012.

That was only the start of record-breaking medicine for Children's Mercy through the Genome Center.

The Children's Mercy Genome Center is the only pediatric genome center in the world with single-cell multi-omics technology and equipment, which supports next generation sequencing. Put simply, this technology is providing the unique data required to advance the most effective treatments possible for patients.

Nearly every pediatric breakthrough currently underway at Children's Mercy finds a common thread in the Genome Center, which is a powerful resource for our physician-scientists, providing the expertise needed to create the breakthroughs of tomorrow.



# Precision Therapeutics

Harnessing the power of the Genome Center  
for **precision therapeutics**

Another critical piece in Jaden's journey was discovered when he visited the Children's Mercy GOLDILOKS clinic. After talking with the family, Jennifer Lowry, MD, Medical Director of the clinic, ordered genetic tests to help identify why most medications don't work for him.

"I still remember walking into this room and there were probably six medical professionals there—doctors, pharmacists and genetic counselors," Julie described. "They said Jaden was a rare, rare case. He is a poor metabolizer for any drug that uses specific genetic metabolizers."

For the Yorks, Jaden's test results explained why the 9-year-old didn't get better when prescribed medicines that help most other children.

**That information was a game-changer for us.**

Julie, Jaden's mom



“From routine medicines we all take, like ibuprofen or cold medicine, to anti-depressants, they just don’t work for Jaden. That information was a game-changer for us,” Julie added.



Dr. Lowry counseled the family and gave them a list of medications that may require significant dosing adjustments for Jaden. Julie carries it with her everywhere she goes to this day. She’s also made sure the nurse at Jaden’s school has it, along with anyone else who might be caring for her son.

**“The diagnosis from the GOLDILOKS Clinic was even more important for us because it changed how we medically treat Jaden.”**

**Julie, Jaden’s mom**

## GOLDILOKS

- Genomic and
- Ontogeny-
- Linked
- Dose
- Individualization and
- cLinical
- Optimization for
- KidS

GOLDILOKS is one of the few pediatric precision medicine clinics in the nation, and the only one of its kind in the Midwest. This medical team sees children who have not responded to their prescribed medications as expected and identifies factors that make each child unique to determine their “just right” dose of medication.

The GOLDILOKS clinic has identified improved dosing for chemotherapy patients to lessen toxicity and negative drug reactions and improve effectiveness. They have developed a clinical modeling tool to help physicians know how much medicine to prescribe based on a patient’s unique situation, and so much more.

The Children’s Mercy Clinical Pharmacology program is the largest in North America investigating the use of medications in children. The program will serve as a model of integrated research that will extend throughout the Children’s Research Institute.



## Stopping a leading cause of acute illness in the NICU

Necrotizing enterocolitis, or NEC, is a killer disease that affects the intestines of premature infants. Previously stable infants can die within 24 hours of developing NEC, which is rare in modern medicine. Venkatesh Sampath, MD, Director of Neonatal Lung and Immunology Laboratories, is determined to stop the devastating effects of NEC for infants and families.

“How we manage these kids is the same as 35 years ago,” Dr. Sampath said. “Which human disease can you say that about? It’s because we don’t understand it.”

The inroads we’re making with genetics could help us understand why NEC is caused and how to prevent the disease.

Dr. Sampath

Working with the Genome Center and conducting some of the largest newborn studies in the U.S., Dr. Sampath is currently identifying which genes impact NEC, therefore understanding which babies are more susceptible to NEC. In addition, his team is working to identify naturally occurring microbes (probiotics, if you will) that if given to susceptible babies could prevent NEC.



## Pioneering the power of precision therapeutics in the NICU

More than 80% of the medications used in the NICU aren't FDA-approved for babies. And many of them have not been adequately studied. Because of this, the drug responses are variable and unpredictable. Using her dual expertise in neonatology and clinical pharmacology, Tamorah Lewis, MD, PhD, is pioneering precision therapeutics in the NICU.

“With the discoveries from my research program, we can practice precision therapeutics in the NICU for the first time.”

Dr. Lewis

“Given an individual baby's age and genetic makeup, theoretically you can individualize a dose for that baby that will maximize efficacy and minimize toxicity.”



## Pediatric Bioethics

Children's Mercy has one of only three pediatric bioethics centers in the country. We're leading the way in thoughtful engagement with our patients and families, specifically related to genome sequencing and precision therapeutics. Our Bioethics team works closely with innovators at the Center for Genomic Medicine and the Children's Research Institute to think about the ethical considerations that should guide development of cutting-edge technologies.



**“Research involving children raises complex ethical issues. Generally speaking, we don't like to subject children to the risks of unstudied innovations. But if we do not do research, then we will never know which treatments are safe and effective or which have unanticipated risks. The Bioethics Center at Children's Mercy works closely with researchers and regulatory agencies to ensure that our research projects adhere to the highest ethical standards. We have collaborated with researchers in genomics, neonatology, nephrology, neurology and emergency medicine to design clinical studies that answer important clinical questions.”**

**John Lantos, MD, Director of Bioethics Center**

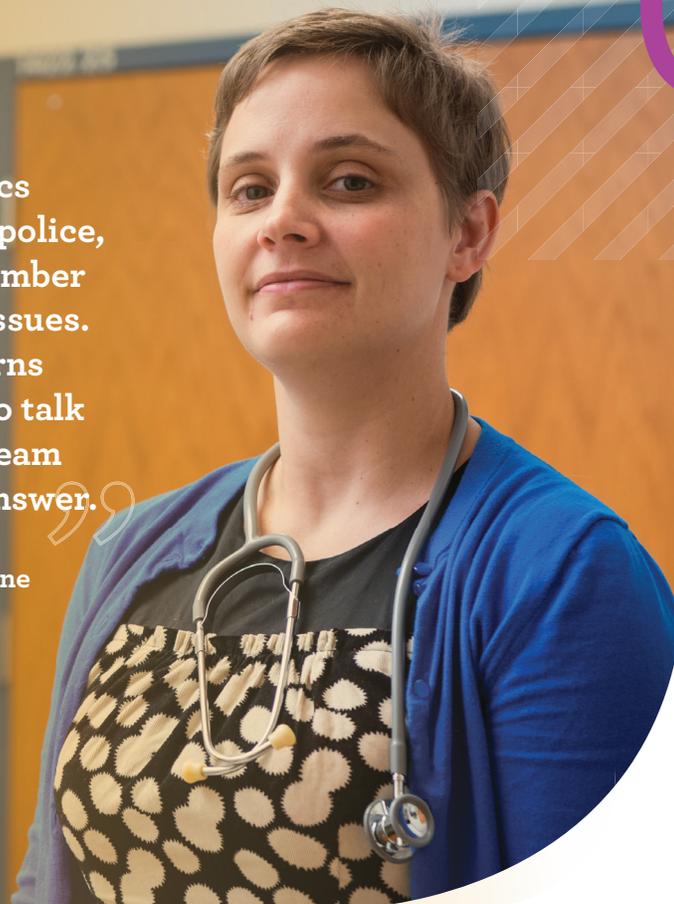
Children's Mercy is unique in having a hospital-based pediatric bioethics center with faculty available for immediate and ongoing consultation and collaboration with clinicians and researchers.

As we develop the cures of tomorrow, we're lucky to do so with thoughtful experts at our side, ensuring that we always do what's best for kids, in every way.



“At Children’s Mercy, the ethics committee is not seen as the police, but as a partner and team member that helps us think through issues. People feel safe airing concerns about choices that are hard to talk about. We talk to the ethics team for perspective, not for the answer.”

Laurel Willig, MD, Medical Director,  
Center for Pediatric Genomic Medicine



# Our Quest to Find Answers

## Children's Research Institute

Our new Children's Research Institute, a nine-story tower wholly devoted to research, will further accelerate our groundbreaking research.

The National Institutes of Health allocates only 10% of its \$37 billion research budget to pediatrics, while only 5% of the more than 7,000 rare pediatric diseases have an FDA-approved drug. Put simply, this lack of funding and focus means kids are being left behind.

The discoveries unlocked in the CRI will allow us to diagnose more quickly, treat more precisely, and cure and prevent childhood disease. Children's Mercy will become a destination for children and families looking for answers. We look forward to the CRI opening in late 2020.





The CRI is really going to make a difference in the quality of medical care and in the advancement of medical care for children. It's going to have a tremendous impact on Kansas City. People will come here for the unique care CRI and Children's Mercy will be able to provide.

Charlie Egan, Durwood Foundation, CRI donor

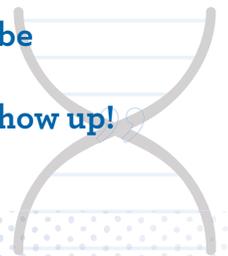
# Hopes, dreams and cures for kids

This summer, patients, employees and donors came together to sign messages of love and hope on a structural beam that will forever be a part of the Children's Research Institute.

In the new Research Institute, our physician-scientists will work hard every day to answer our biggest questions – why do children get sick and how can we prevent and cure their diseases? And they'll do so with these signatures overhead, inspiring and motivating their work.



“We will find the cures! CRI will be world-renowned. KC will be the destination for care. Love will show up! Jack and Julie, CRI donors”





**That CRI becomes the shield of LOVE that WILL protect and cure our children.**  
Debbie, Supply Chain Services



**“To find cures to heal the next generation.”**  
Carrie, Patient Access



**“It will help many children achieve their dreams. Help families stay whole. Give hope to the hopeless.”**  
Samone, 4 Sutherland



**Department of Philanthropy**  
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