

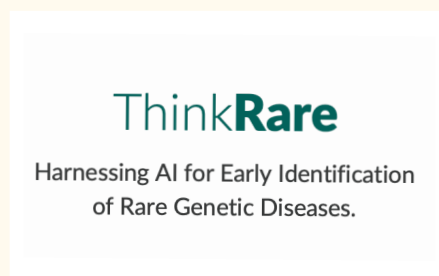


Research is a fascinating part of the work that goes on at CHEO. The CHEO Research Institute brings the power of great scientific minds to the issues facing children and makes innovation and improvement possible in all areas of pediatric healthcare. In labs and clinics, physicians, scientists, researchers and learners expand the boundaries of medical knowledge, uncovering the roots of disease and mapping new treatment options that save lives and bring hope to the next generation. Behind all of this ground-breaking, inspiring, and healing work are years of tireless and meticulous study, made possible by dedication and donor dollars.

**In 2023 donor funds supported 795 studies. Here are a few examples of the progress that generosity fuelled:**

## ThinkRare and Artificial Intelligence

Researchers are often at the forefront of advances in technology, finding ways to bend these new tools to the practical outcomes they are seeking. CHEO researchers recently harnessed the power of artificial intelligence (AI) to develop a groundbreaking search algorithm that identifies children and youth who may have an undiagnosed rare genetic disease and refers them for genetic testing – putting an end to their diagnostic odyssey.



ThinkRare was born from this work and is already changing the future of some patients at CHEO.

*“The ThinkRare algorithm means we can help families find answers and get the care and support they need sooner,”* said [Dr. Kym Boycott](#), Senior Scientist at the CHEO Research Institute and Chief of Genetics at CHEO. *“This algorithm is a game changer. Using AI to scour CHEO’s electronic health record based on set criteria, ThinkRare can accurately identify kids who may have an undiagnosed rare genetic disease and refer them to our clinic – something that may have never happened without it.”*

For patients like 10-year-old Antony Wistaff, who visited CHEO so often it is his “second home”, this meant going from the unknown to a diagnosis, thanks to the ThinkRare algorithm. *“When we found out that Antony was diagnosed with Chung-Jansen Syndrome, it answered so many questions for our family,”* said Georges Wistaff, Antony’s dad. *“This research brought a kind of peace to our house. Had we known this sooner, it would have meant less questioning as a parent, less stress, and more support because we would have had a clear diagnosis for Antony. A little bit of blood and a simple test, answered so many questions.”*

This incredible feat would not have been possible had it not been for the establishment of the Data Informatics Team and infrastructure at the CHEO Research Institute – made possible by donor funding.



## Early Return to School After Concussion Reduces Symptoms

The treatment of concussion in children and youth has gone through changes in recent years. There can be ongoing questions for parents and caregivers around the proper care strategy. [Dr. Andrée-Anne Ledoux](#), Scientist at the CHEO Research Institute, was involved in research that discovered an early return to school (less than two days) after experiencing a concussion, is associated with fewer symptoms and ultimately, a faster recovery. The study that led to this conclusion was the largest pediatric concussion study with over 3,000 youth aged five to 18, examined in nine pediatric emergency departments in Canada within the Pediatric Emergency Research Canada network, led by [Dr. Roger Zemek](#).

*“As a pediatric emergency physician who treats hundreds of youths with new and persistent concussion symptoms, I see far too many kids who are told to avoid school until they are symptom-free which can cause more harm and delay the recovery process. The results of this study provide strong evidence that an early return to school is associated with better outcomes,”* said Dr. Roger Zemek, Senior Scientist at the CHEO Research Institute, and Professor and Clinical Research Chair in Pediatric Concussion at the University of Ottawa.

## Type 2 Diabetes and Sleep

In our hectic modern world, sleep has become a precious commodity especially for the developing bodies and brains of young people. When it comes to youth with a pre-existing condition, sleep is even more important. Medical experts have learned a great deal about the importance of sleep in overall health in large part by seeing what happens when it is lacking.

Many studies have shown the negative results of poor sleep, but very few have tried to increase sleep and determine if it improves health. A randomized trial conducted at CHEO under the leadership of [Dr. Jean-Philippe Chaput](#) was the first to report that a short-term increase in sleep duration by one hour per night for one week in adolescents at high-risk of type 2 diabetes improves insulin sensitivity by 20 percent compared to a week of habitual sleep.

These findings were independent of other factors in the participants including food intake and physical activity. Ultimately it was determined that whenever possible, clinicians should empower youth at risk of type 2 diabetes to improve their sleep, since even a modest increase in sleep duration can have a positive impact on insulin sensitivity in this patient population.

**Watch**

[Discovery Minute: Increase insulin sensitivity with better sleep with Dr. Chaput](#)





## Treating Pain Catastrophizing in Children and Youth

Dr. Christine Lamontagne's research focus is on pediatric pain prevention and management. When dealing with pain, young patients can struggle to regulate their reaction to both the sensations in their bodies and the emotions that result from them. In some cases, children, youth, and their caregivers can begin to fear pain to the point that treatment is compromised, and medical interactions are dreaded. This is referred to as pain catastrophizing.

Pain catastrophizing (PC) is the tendency to magnify the threat of pain to the point where anticipation can increase the intensity of post-surgical pain, functional disability, and chronic pain. Up to 20 percent of children and youth may develop persistent pain after surgery. Treating PC in caregivers and youth prior to surgery may improve recovery and surgical outcomes. The pain team at CHEO has developed and evaluated a virtual psychoeducational workshop addressing PC for pre-surgical youth and their caregivers. The findings show that this single session group intervention was successful at reducing PC in caregivers and in youth with pre-existing anxiety. Approximately 80 percent of patients and caregivers were moderately to highly satisfied with the workshop and found the information useful and easy to understand.

### Caregivers shared feedback such as:

- The workshop included facts which were important, and coping skills that could be used by kids.
- It was a good opportunity to remind parents and patients that high interest distractions are important post-surgery and when experiencing pain.
- It was very engaging and is good to reinforce positivity.

## Addressing the Burden of Chronic Respiratory Diseases in Indigenous Peoples

[Dr. Tom Kovesi](#), Investigator at the CHEO Research Institute, recognizing that Indigenous peoples around the world bear a disproportionate burden of chronic respiratory diseases which are associated with increased risks of morbidity and mortality, collaborated with researchers from around the globe to study this issue. The team involved reviewed evidence on the burden of chronic respiratory diseases in Indigenous peoples globally, and summarized factors that underlie health disparities between Indigenous and non-Indigenous communities.

Resulting from this work, Dr. Kovesi was able to propose a framework of approaches to improve the respiratory health of Indigenous peoples and outline future directions for clinical care and research. Efforts to tackle this disproportionate burden of chronic respiratory diseases must include both global approaches to address contributing factors, including making healthcare and research more inclusive, and local approaches, co-designed with Indigenous people, to provide care that respects and strengthens Indigenous cultures and ensures resources are distributed more fairly.

A specific example from this research includes the measurement of fine particle concentrations in First Nations Housing in the Sioux Lookout Zone of Northwestern Ontario. By determining contributing factors such as non-electric heating and lack of Heat Recovery Ventilators (HRVs), the cause of respiratory challenges is more clearly understood.

The scope of research at the CHEO Research Institute is vast and the goals are vitally important. Inspired by infants, children and youth, researchers continue to ask questions that matter most to families and push the boundaries of current knowledge to make groundbreaking discoveries. The breakthroughs of the future rely heavily on the generosity of our community. Consistent and reliable funding through donor dollars is the lifeline for research.

