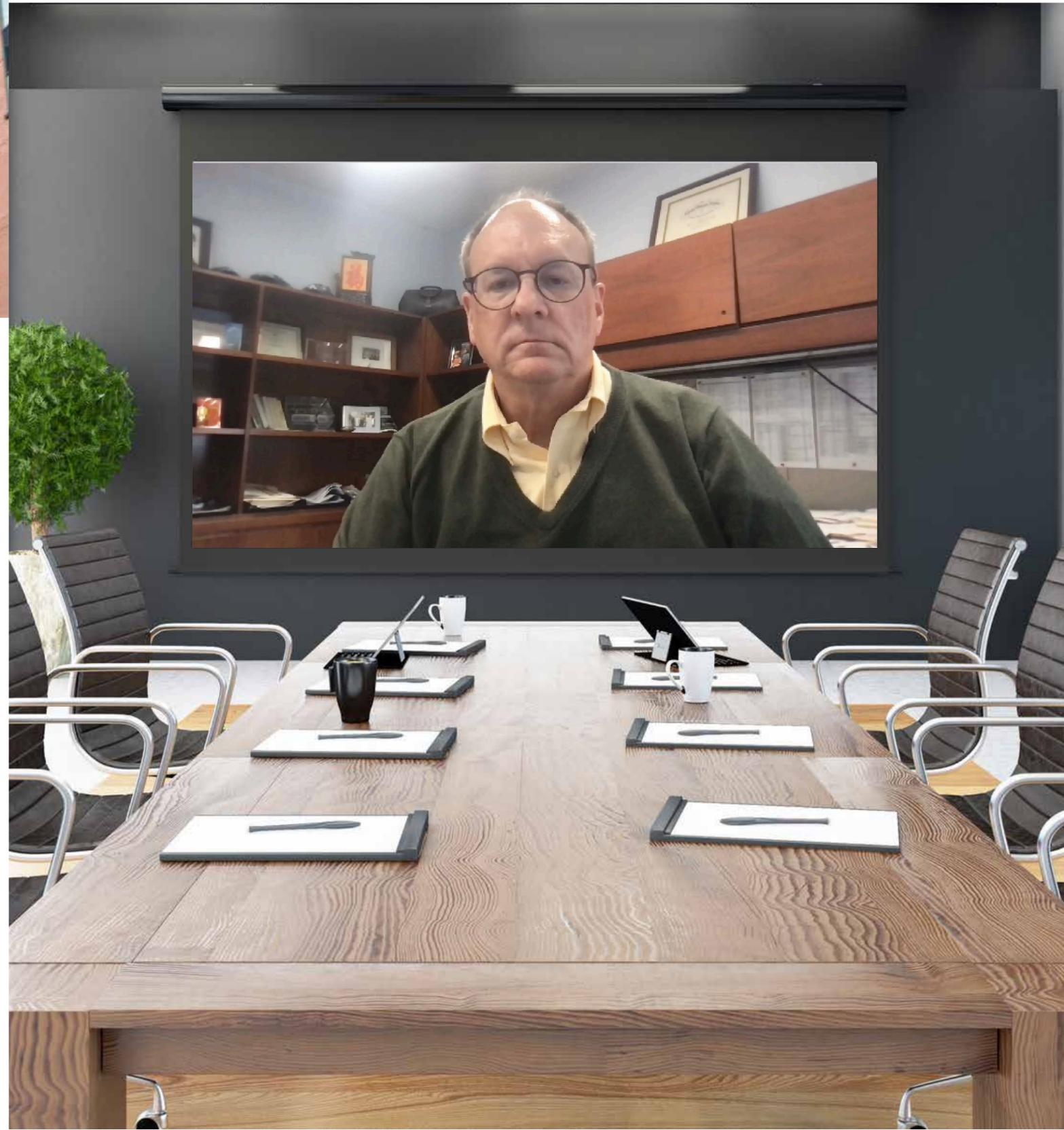




# ANNUAL REPORT 2020-2021



# MESSAGE FROM THE GFCC DIRECTOR



- 3** Message from the GFCC Director
- 4** Mission, Vision, Priorities and Goals
- 5** By the Numbers
- 6** Leadership Team
- 7** Please Welcome Linette Margallo, Clinical Executive Director
- 8** Year of the Nurse
- 9** Help in the Search for Hope
- 10** Pathology, Virtually
- 11** CAR T-Cell Therapy: How it Works
- 11** CAR T-Cell Therapy and a Space to Innovate: An Update on the Cellular Therapies Facility
- 12** Playing Dress Up with a Treatment Backpack
- 13** Ultrasound Guided Access Make Intravenous (IV) Insertions Easier on Children
- 14** Clinical Advisory Council Innovative Project Funding
- 15** Owen's Story
- 17** Virtual Support Groups: Supporting patients, siblings, and caregivers during COVID-19
- 18** Pitblado Discovery Grant Competition
- 20** A Novel Approach to the Challenge of Retinoblastoma - Location is Key
- 21** GFCC Virtual Cancer Research Week
- 22** Garron Chairs in Childhood Cancer Research: From Discoveries to Recoveries
- 23** Restracompe Fellows & Students
- 24** Training the Next Generation of Clinician-Scientists
- 25** GFCC Family and Education Events

# MISSION, VISION, PRIORITIES AND GOALS

## OUR MISSION

The mission of the Garron Family Cancer Centre (GFCC) is to facilitate and catalyze innovation in multi-disciplinary research, clinical care and education. We believe that discovery and translation of new knowledge will transform clinical practice and improve clinical outcomes and quality of life for children, adolescents and young adults with cancer and their families.

## OUR VISION

Better outcomes for children with cancer through multi-disciplinary collaboration, discovery and innovation.

## OUR PRIORITIES

The GFCC leadership has identified three strategic priorities that align with and leverage existing institutional and programmatic strengths. These priorities will guide the focus and investment of the Centre over the next 5 years.

- Improve the cancer journey through innovation
- Empower our people
- Optimize communication

## OUR GOALS

The broad goals of the GFCC are:

- To elevate cancer care
- To deliver cutting edge innovative cancer therapies
- To create a more integrated cancer research community
- To support innovative cancer research

## 2020/21 BY THE NUMBERS

(April 1, 2020 to March 31, 2021)

# 1/DAY

SickKids sees an average of one new cancer patient every day

# 1400+

admissions per year

# 20,000+

clinic visits per year

>80% of children diagnosed with cancer at SickKids will survive

## CANCER DIAGNOSIS

# 163

leukemia & lymphoma patients

# 67

brain tumour patients

# 133

solid tumour patients

## TRANSPLANTS AND CELLULAR THERAPIES

# 102

blood and marrow transplants performed for patients with cancer

# 22

CAR-T infusions



## LEADERSHIP TEAM

### EXECUTIVE COUNCIL



**Brent Derry, PhD**  
Senior Scientist,  
Developmental &  
Stem Cell Biology



**Meredith Irwin, MD**  
Chief of Paediatrics  
Oncologist, Division of  
Haematology/Oncology/BMTC  
Senior Scientist, Cell Biology



**Jane McGlade, PhD**  
Senior Scientist,  
Cell Biology



**Vijay Ramaswamy, MD**  
Oncologist, Division of  
Haematology/Oncology/BMTC  
Scientist-Track Investigator,  
Developmental & Stem  
Cell Biology Program



**Michael Taylor**  
Neurosurgeon, Division of  
Neurology, Garron Family  
Chair in Childhood Cancer  
Research, Senior Scientist,  
Developmental and Stem  
Cell Biology Program



**Judy Van Cleef,  
RN, BScN, MN**  
Vice President, Clinical



**James Whitlock, MD**  
Director,  
Garron Family Cancer Centre  
Division Head, Haematology/  
Oncology/BMTC  
Senior Associate Scientist,  
Translational Medicine Program



**Sue Zupanec, NP, MN**  
Nurse Practitioner,  
Division of Haematology/  
Oncology/BMTC

### EX OFFICIO MEMBER

**Ulana Bochniewicz**  
Associate Director, Major Gifts, SickKids Foundation

### PROGRAM MANAGERS

**Donna Berry, PhD**  
Program Manager, Garron Family Cancer Centre

**Kathryn Breckbill, PMP**  
Program Manager, Garron Family Cancer Centre and Transplant & Regenerative Medicine Centre

**Devon Williams (Interim), PMP**  
Program Manager, Garron Family Cancer Centre and Transplant & Regenerative Medicine Centre



## PLEASE WELCOME LINETTE MARGALLO, CLINICAL EXECUTIVE DIRECTOR

Linette joined the Cancer Care Program in 2020. She feels privileged to work with the teams across the Emergency Department (ED), Registration, Haematology/Oncology, Blood & Marrow Transplant/Cellular Therapy (BMT/CT), the Clinical Trials Support Unit (CTSUs) and the Paediatric Advanced Care Team (PACT). She began her nursing career at SickKids in 1999 as a Staff Nurse primarily practicing in the ED, progressing through various leadership roles such as Advanced Nursing Practice Educator and Senior Clinical Manager. Her portfolios have supported various care areas including Inpatient Surgery & Trauma, and now the Cancer Care Program. Throughout her career, Linette has enjoyed educating new nurses and developing

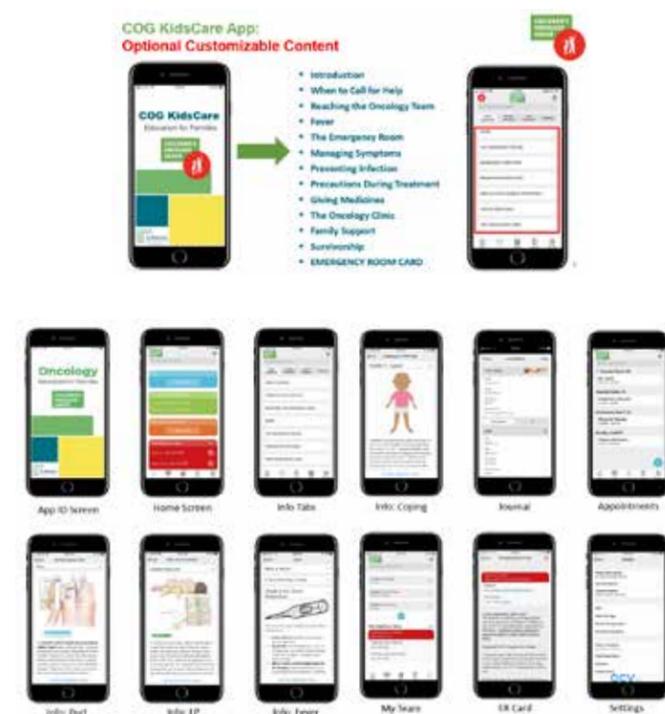
emerging leaders through coaching and mentorship. Driven by data, excited by the use of artificial intelligence and machine learning in healthcare and the advancements in precision child health, she continues to focus on the challenge of meeting the growing demand for services across her portfolio and integrating cutting-edge clinical research into care at the bedside. Some of Linette's professional accomplishments include collaborating to create streamlined processes for patient access to care and building capacity in her teams to take a balanced approach to continuous improvement – balancing efficient processes with the goal of constantly striving to improve the quality of care, and maintaining patient, families & staff safety. Linette holds a Bachelor of Science (with a major in Exceptionality in Human Learning), a Bachelor of Science in Nursing, and a Master of Nursing Degree from the University of Toronto.



Her nursing leadership institutionally and internationally in the use of blinatumomab, a powerful new immunotherapy drug for children with hard-to-treat forms of Acute Lymphoblastic Leukemia, the most common childhood cancer, has not gone unnoticed.

Recently, Sue was the successful recipient of funding through Great Cycle Challenge (the annual cycling event and fundraiser that raises funds to fight cancer across Canada, in partnership with the SickKids Foundation). One of the goals of the Great Cycle Challenge is to support paediatric cancer in communities across Canada and with a focus on collaborations with other C17 institutions. C17 is the national leadership organization for childhood cancer and blood diseases. Sue's innovative idea was to take a fully functional smartphone app, developed by COG in the United States, and empower C17 institutions across the country with the ability to customize the app with institutional-specific information about the oncology team and clinic, family support available, and when to go to the emergency room. The app has already proven to reinforce parental learning in caring for a child with cancer by arming caregivers with readily available information from a trusted source.

When it comes to oncology, Sue believes in a holistic approach to care – treating a child's physical needs, and their emotional and psychological ones, too. The best advice Sue has ever received is this: 'In the world of childhood cancer, bad things can and do happen, even when you have tried your very best'. Sue finds motivation and opportunity in the 'bad things'. She tirelessly strives to challenge herself, and others in the field, to achieve even better than our current best.



## YEAR OF THE NURSE – CELEBRATING SUE ZUPANEC: NURSE PRACTITIONER, LEADER, AND TRAILBLAZER

Sue Zupanec has been revolutionizing nursing practice, leadership, education, research, and innovation for over 30 years. In that time, she has co-authored more than 30 research publications that have helped shape the current cancer care landscape for children.

At SickKids, she's a Nurse Practitioner in the Leukemia and Lymphoma Program. She works in the outpatient clinic seeing multiple patients a day for physical assessments, treatment plan reviews, guidance on what to expect, coordination of care, and treatment and investigation orders, as needed.

Sue is also the chair for the Nursing Discipline of the Children's Oncology Group (COG) and holds a leadership role on the Garron Family Cancer Centre's Executive Council. These leadership roles give her overall perspective and insight and her work on the ground gives her a nuanced and detailed understanding of the patient/family experience.

As a proud educator, Sue helps build the capacity of new nurses through skilled mentorship. With complex therapies and often even more complex family dynamics, new staff need adequate support and guidance. Without it, these nurses often experience moral distress, decreased resiliency, and eventual burnout. Her prescribed stress relief? Music and laughter. 'It is important to have fun', says Sue.

It's her deep passion and unrelenting curiosity about new possibilities and potentially life-saving treatments for childhood leukemia that sets Sue apart from many of her peers.

## HELP IN THE SEARCH FOR HOPE

The move away from empiric, toxic chemotherapy treatments toward targeted cancer-fighting medications is an ever-changing landscape. For patients and families, it's challenging to keep up with clinical trials, especially when coupled with the daily pressures of taking care of a sick child. That's why the GFCC, with funds raised by the Great Cycle Challenge in partnership with the SickKids Foundation, supports the Paediatric Oncology Drug Access Navigator position (DAN-PO). Sandra Judd, a pharmacist who previously supported the New Agents and Innovative Therapies (NAIT) program at SickKids was hired to fulfill the role. Sandra provides support to childhood cancer programs across Canada who want to access novel, innovative or investigational therapies for paediatric, adolescent, and young adult oncology patients. By navigating the unique regulatory, funding and access barriers faced in Canada, Sandra serves as both a local SickKids and national resource assisting clinical teams to address these challenges and obtain drug therapies which are not available via the usual funded routes. Sandra

facilitates more than 10 requests for drug access navigation support by clinicians across the country every single month.

The feedback on the extraordinary success of Sandra's work thus far stimulated a need for additional infrastructure to support the growth and development of her role. And so, the GFCC supported the development of an IT solution by way of a data repository to help clinicians navigate the complex, often delayed process to find the path to obtain drug access. This solution is embedded in the Precision Oncology for Young People (PROFYLE) project – a national group of research and funding partners working together to molecularly profile patient tumours and find better therapies to treat them. Now, Sandra can streamline and align efforts to acquire medications that meet the needs of Canadian children with cancer.

Limited access to effective treatment drugs is one of the factors that leads to disparities in cancer survival between provinces and communities. The GFCC is committed to leveling the playing field.





**CAR T-CELL THERAPY AND A SPACE TO INNOVATE:  
AN UPDATE ON THE CELLULAR THERAPIES FACILITY**

CAR T-cell therapy is a promising new treatment option for leukemia patients who have exhausted all other treatment options. The therapy is a new, individualized treatment that involves removing select immune cells from the bloodstream, genetically altering them to target cancer cells, and then infusing them back into the bloodstream to multiply and attack the leukemia cells. This approach has produced long-term remissions in hundreds of children and adults.

SickKids was one of only two Canadian institutions to offer a clinical trial using CAR T-cell therapy for relapsed patients with B-cell acute lymphoblastic leukemia.

To date, 50% of patients with previously incurable leukemia receiving that therapy have had sustained remissions.

Dr. Donna Wall and her team are preparing to move into the new Cellular Therapies Facility in the hospital. Inside this new facility's walls, CAR T-cells can be manufactured right here at SickKids instead of sending them off to the United States. By doing so, Dr. Wall's team will get treatment to patients with acute lymphoblastic leukemia much faster and also be able to target other challenging diseases such as acute myeloid leukemia, neuroblastoma, brain tumors and sarcomas through investigator-initiated trials. "For our patients who have relapsed or have advanced cancer, getting them treatment in a matter of weeks instead of months is critical," says Dr. Wall.

# CAR T-CELL THERAPY: HOW IT WORKS

Modifying the body's immune system to treat cancer.

**PATHOLOGY, VIRTUALLY**

Pathologists play a critical role in the accurate and timely diagnosis of paediatric cancer. Pathology, the study of disease, is the bridge between symptoms and clinical care. "A cancer patient's journey to recovery depends on the diagnosis," says Dr. Gino Somers, Paediatric Pathologist and Head of the Division of Pathology at SickKids.

SickKids has the most extensive and most specialized paediatric pathology department in the country. From the 1,400 cases of childhood and adolescent cancer diagnosed in Canada every year, it is no surprise the department receives hundreds of second opinion consultation requests from health providers across the country. Most are seeking to confirm a difficult diagnosis.

A significant challenge to timely consultations is that the traditional process is extremely cumbersome. Glass slides are couriered from across Canada, sometimes arriving broken and delayed, especially in the face of the COVID-19 pandemic.

The Canadian Paediatric Digital Pathology Network at SickKids, led by Dr. Somers, in partnership with seven other Canadian paediatric health care institutions, is aiming to improve this process by accelerating consultations, without compromising accuracy. Rather than shipping biological specimens affixed to glass slides across the country, through the Network high-resolution images from those glass slides are digitized using a specialized scanner located at each site. The scanned, digitized images enable expert pathologists to read and analyze results in real-time using the most novel techniques available and accessible at SickKids.

When a diagnosis is accurate and made in a timely manner, a cancer patient has the best chance of a tailored treatment plan and positive outcome. Through the Canadian Paediatric Digital Pathology Network, there is hope for better outcomes for kids with cancer across the country.



**1** Remove T-cells from a patient's blood



**2** Genetically alter the T-cells to express proteins that target cancer cells



**3** Inject the modified cells into the patient



**4** The genetically engineered T-cells find and kill cancer cells

## PLAYING DRESS UP WITH A TREATMENT BACKPACK

### IMMUNOTHERAPY BACKPACKS

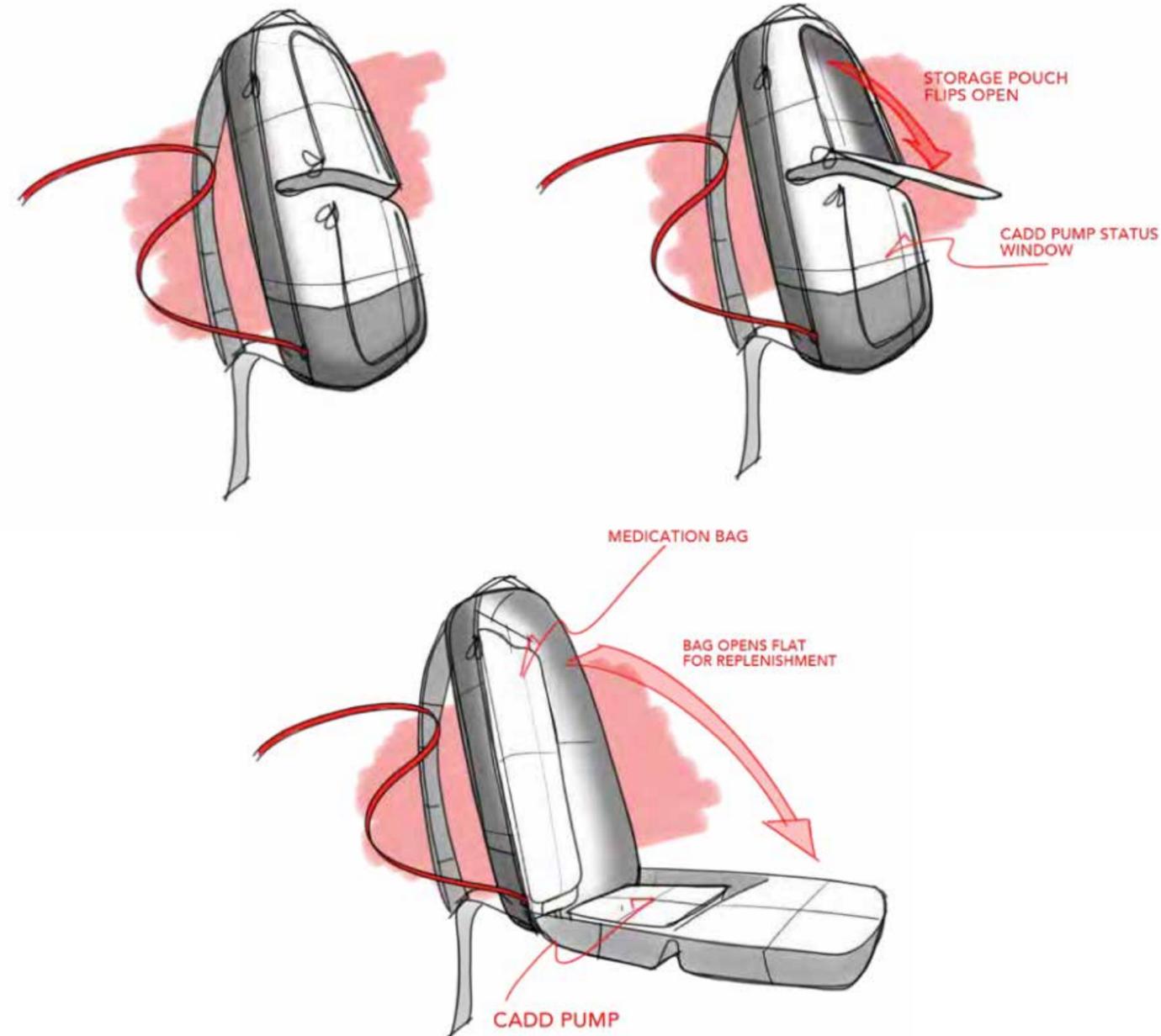
Paediatric B Lineage Acute Lymphoblastic Leukemia (B-ALL) is the most common cancer diagnosis in childhood. And despite initial cure rates of over 90%, children and teens with relapsed B-ALL have a survival rate of less than 50%. To improve the odds for these patients, we are using an immunotherapy drug called blinatumomab. There have been promising results showing improved response and better survival rates for those who have relapsed.

The GFCC has begun testing blinatumomab in up-front ALL trials. The drug is administered with an infusion pump 24 hours a day for a 28-day course. To help improve quality of life, an innovative project at the GFCC aims to engage children

aged 3-10 years in selecting and designing good-looking medical backpacks to allow kids to be active and at home during treatments instead of inside a sterile hospital room.

“We heard from many families that their kids didn’t like the current medical bag because it was a visual identifier of illness,” says Sue Zupanec, SickKids Nurse Educator and project lead. The improved design of the new backpacks will be more functional and discreet, resembling a more typical bag.”

Once consultations are completed with the industrial designer, paediatric oncology nurse experts, patients, and their families, child life specialists, and children on how the backpacks will be tested to determine acceptability, function, and user experience.



## ULTRASOUND GUIDED ACCESS MAKE INTRAVENOUS (IV) INSERTIONS EASIER ON CHILDREN

Children’s veins are small and often difficult to access. This is a challenge when necessary medical treatment requires an intravenous (IV) line. Inserting an IV in children can be distressing and painful, especially if multiple attempts are required. Establishing therapeutic trust while ensuring a safe and supportive experience is critical for patients undergoing cancer treatment.

Ultrasound guided IV access is a technique used to improve the probability of successful insertion on the first attempt by allowing better visualization of the vessels. SickKids Haematology/Oncology Nurse Practitioner Emily Clarke and Vascular Access Team Nigel Ruse have been leading the charge on obtaining medical equipment to support the regular use of this technique. Emily and Nigel have worked to develop a curriculum to improve competency for our oncology nurses.

“Once we secured an ultrasound machine, we developed a competency-based ultrasound guided IV program, says Nigel. To-date, eight nurses from Haematology and Oncology Day Hospital have been trained with great success. In the past 3 months alone 72 ultrasound guided IVs have been placed with a 94% success rate. As a result, there has been a 70% decrease in calls to the Vascular Access Team for assistance with challenging IVs. Not only has this increased efficiency, but importantly, improved the quality of care we provide and the experience of our patients.”

SickKids’ approach for delivering health care is centered on the needs of the patients. By using this new technique, our care team has been able to decrease anxiety and pain and reduce the number of attempts required to achieve successful IV access.





## CLINICAL ADVISORY COUNCIL INNOVATIVE PROJECT FUNDING

The GFCC is committed to funding initiatives to support the Centre's vision: Better outcomes for children with cancer through multi-disciplinary collaboration, discovery, and innovation. The project highlighted is a spotlight on one of the successful recipients of the 2020-2021 Clinical Advisory Committee Innovation Funding competition.

### DEVELOPMENT OF VIDEOS ON SAFE HANDLING OF CHEMOTHERAPY AT HOME AND DEVELOPMENT AND TRANSLATION OF ABOUTKIDHEALTH FAMILY MED AIDS AND HEALTH INFORMATION

Hazardous medicines are used to treat a variety of medical conditions. Chemotherapy, for example, is used to treat cancer, and immunosuppressants are used to prevent organ rejection after a transplant. Hazardous medicines can damage healthy cells, meaning that anyone handling hazardous medicine must keep themselves protected. This project, led by SickKids Clinical Pharmacists, developed a series of videos and accompanying Family Med Aids on the safe handling of hazardous medicines at home and is now available on [YouTube](#) and the [AboutKidsHealth website](#).

Did you know that it is important for caregivers to take special precautions with their child's waste (vomit,

urine and stool) while they are taking hazardous medicines? Watch the videos to learn more.

Key tips for safe handling of hazardous medicines at home:

- If possible, avoid contact with hazardous medicines if pregnant or breastfeeding
- The caregiver and child should wash their hands before and after handling hazardous medicines
- Anyone handling hazardous medicine tablets, capsules or liquids should wear gloves
- Hazardous medicine and equipment should always be properly cleaned, disposed of and stored

The population served at SickKids is diverse; treating patients from various ethnic backgrounds whose primary language is not English nor French. These patients often require an interpreter so the health care team can communicate effectively with them. These families require the same teaching and tools to support and reinforce the education that is provided to them. Therefore, the accompanying written information to the videos have been translated to several other languages that can be utilized by these families.

## OWEN'S STORY



### OWEN'S STORY

By Kathy Motton, Director, Communications and Marketing, Childhood Cancer Canada

Owen Munday's story was a part of a Childhood Cancer Canada campaign for International Childhood Cancer Day, to create awareness on the importance of kids having access to early phase clinical trials and precision therapies.

#### Diagnosis: Hyper Mutant High Grade 4 Glioblastoma Age at Diagnosis: 14

Owen Munday was a typical teenager who loved hanging out with his girlfriend and friends, gaming, visiting the local recreation centre, and surfing the internet. He had been experiencing unusual consistent headaches and nausea. The family doctor started treating Owen for meningitis, but his family knew something else was going on. Owen's dad insisted on an MRI, which showed a mass in the middle of his brain. Owen was diagnosed with a high-grade glioblastoma brain cancer just before Christmas in 2018 and two months before his 15th birthday.

Glioblastomas are fast-growing tumours with threadlike tendrils that can extend into many parts of the brain and spinal cord. Treatment of glioblastoma typically depends on the location of the tumor and how far it has progressed. Surgery and radiation therapy, with chemotherapy during or following radiation, are the standard treatments. They are difficult to treat, and often return, even with the most intensive treatment.

At first, Owen's treatment followed standard protocol, which is surgery to remove the tumour followed by six weeks of chemotherapy and radiation. He found the chemotherapy he was on to be easy to take, as it was in pill form. The main side

effects he experienced was some hair loss and nausea. He found radiation to be the most difficult part of his standard frontline treatment, as it zapped his energy and made him feel very tired. He would get home to the Ronald MacDonald House and go right to bed. Owen completed his radiation treatment and the family was able to return to their home in Barrie. He continued his chemotherapy and was able to return to school.

However, after a few weeks Owen's headaches returned and the satellite Hospital sent him back to SickKids Hospital in Toronto. After an emergency MRI it became apparent that standard treatment wasn't working for Owen. The cancer had returned and had spread with five new tumours the size of a pea through his brain and his spine. After consulting with Owen and his family in May 2019 and receiving his consent, his doctors decided to enroll him on an experimental clinical trial that examined the effectiveness of a drug called nivolumab. Cancer cells are very good at blocking the immune system from doing its job and killing these foreign cells in the body. Nivolumab is a checkpoint inhibitor (PD-1) that blocks cancer cells from evading the immune system, allowing it to do its job.

Owen was told it may take a few weeks for his enrollment to be reviewed and approved, and a week or two before he would receive the treatment, but his doctors were able to speed up the process and by the next day they had approval and he was on the clinical trial.

Owen received his first treatment one day after the approval thanks to his doctors' advocacy. Initially, he reacted poorly to nivolumab. He vomited a lot in the first few weeks and ended up spending a few days in the ICU. Eventually his body adjusted to the treatment, and supportive anti-nausea medications like granisetron helped him feel like himself again.

continued from Page 15

Nivolumab is given less frequently than the chemotherapy he was on (every two weeks vs. once a week) however Owen found the nivolumab more difficult to take as he received it through an IV (standard for many chemotherapies). As treatment progressed throughout the months, Owen generally felt better after treatment. Now adjusted to nivolumab, the recovery was much easier. He would head home after treatment happy and ready to play with his new Australian Shepherd puppy dog, Aussie.

Owen is still on active treatment with nivolumab but is NED (no evidence of disease). After only two months, Owen's tumours shrank significantly. He was able to achieve NED after only four months of treatments of nivolumab. This has amazed his doctors who share his story with everyone when discussing nivolumab.

Treatment for someone on nivolumab would typically take place over two years, but because of how difficult high-grade glioblastoma is to treat, Owen's team intends to wean him off the nivolumab slowly, lengthening his treatment to about two and half to three years. However, this is still to be determined.

Overall, Owen is happy to be healthy again. He loves the doctor running the trial, Dr. Bouffet. Owen said Dr. Bouffet is wonderful and speaks to him like an adult, explaining everything patiently and in detail. He also loves working with his social worker David Brownstone at SickKids and it has inspired Owen to become a social worker when he gets older to help others, like everyone at SickKids has helped him become a survivor.

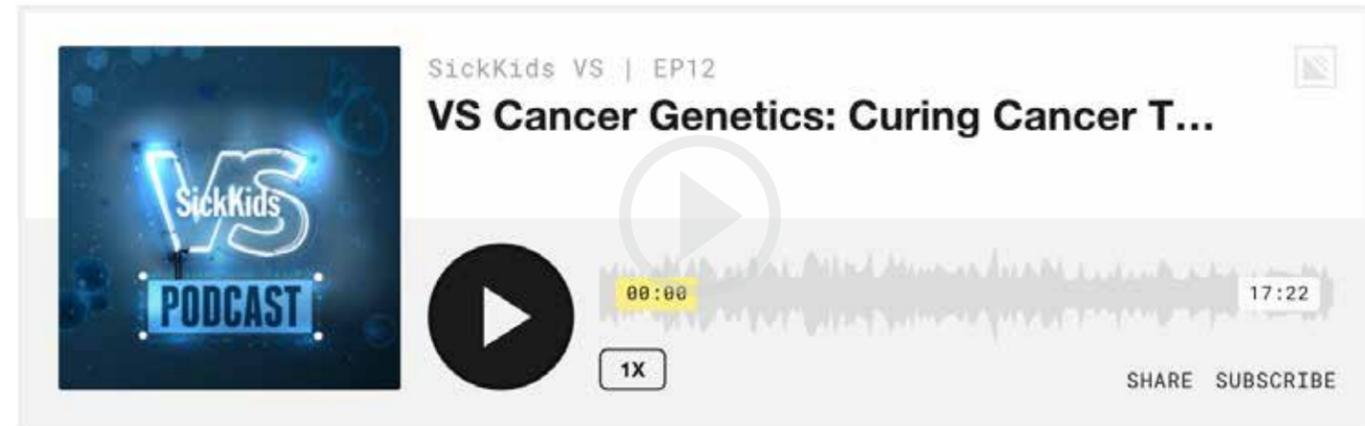
### BABY IZAAAN'S STORY

By: Hannah Bank, Writer for the SickKids Foundation and Host of the SickKids VS Podcast

Baby Izaan's story was a part of SickKids VS. Podcast. Powered by the SickKids Foundation, the podcast gives listeners an inside look into the fight for child health. Each episode tackles a different challenge or innovation and shares the stories of the teams involved in the medical breakthroughs.

Baby Izaan was in trouble. Despite multiple rounds of chemotherapy, his tumour continued to grow, and time was running out. Izaan's oncologist, Dr. David Malkin, enrolled him in KiCS: The SickKids Cancer Sequencing Program. The hope? That by analyzing the tumour's DNA, they could figure out how to stop it.

[SickKids Podcast VS Cancer Genetics](#)



## VIRTUAL SUPPORT GROUPS: SUPPORTING PATIENTS, SIBLINGS, AND CAREGIVERS DURING COVID-19

Over the past year the GFCC's clinical teams have worked tirelessly to ensure care continues to be delivered despite the challenges of the 2019 novel coronavirus (COVID-19). To support patients and caregivers, the Haematology/Oncology Psychosocial Team developed unique virtual platforms. In a recent publication, the team outlined their observations and impact from delivering psychosocial support in a virtual world\*.

The team developed virtual support groups including:

- New oncology diagnosis sibling education: siblings were offered to join a 90-minute session to learn more about their sibling's recent cancer diagnosis.
- Oncology caregiver workshops: one-hour open sessions where several themes were discussed during the 7-week long program including supporting healthy nutrition and sleep habits during treatment.

- Teens4Teen: one hour drop-in session for teens at any stage during their cancer experience.
- Photovoice groups for teens on active cancer treatment and teenage siblings of cancer patients. The first time this program was offered virtually and designed to support patients and their siblings through separate targeted discussion sessions where their individual journey is documented through photography.

The virtual platforms removed barriers including travel costs and the need to take time off work or school to attend in person meetings. Barriers arose around equity of access and privacy but overall, the ease to develop these groups, limited financial costs and facilitators time will lead to continued use of the virtual model for patient, sibling, and caregiver support groups. These types of innovative communication strategies in addressing patients' and families' psychosocial needs during a global pandemic are one more way that the GFCC is leading in childhood cancer care.

\*: Kaka A, Shama W, Lucchetta S, et al. Virtual support groups in paediatric hematology/oncology during COVID-19: Lessons learned from the SickKids experience. *Pediatr Blood Cancer*. 2021;e29378 <https://doi.org/10.1002/pbc.29378>

Members of the Psychosocial team who developed virtual programming





**SICKKIDS-LED RESEARCH TEAM DISCOVERS MECHANISM THAT LEADS LEUKEMIA CELLS TO TRIGGER BONE LOSS, IDENTIFIES A POTENTIAL THERAPY TO PREVENT IT IN LAB MODELS**

**BRAIN CANCER LINKED TO TISSUE HEALING, STUDY FINDS**

**UNCOVERING THE MYSTERIES OF RELAPSED BRAIN TUMOURS**

**NEW RESEARCH SHOWS SARCOMA'S ORIGINS COULD BE DECADES IN THE MAKING**

**PITBLADO DISCOVERY GRANT COMPETITION**

With financial support from the David Pitblado Cancer Research Fund, the GFCC sponsors an annual grant competition to support new and innovative cutting edge research at SickKids. These one-year funding awards provide researchers with the opportunity to explore creative ideas to advance our fundamental understanding of cancer and improve treatment outcomes for our patients. The success of this long-standing competition has allowed the GFCC and SickKids Foundation to leverage funds from other generous donors and expand the program's impact. This year, through support from the David Pitblado Cancer Research Fund, Friends Helping SickKids, the Ewings Cancer Foundation of Canada and Fashion Heals for SickKids, the GFCC was able to fund 11 innovative research projects:

**Peter Dirks:** Characterization of the role of the microbiota in glioblastoma

**Julie Forman-Kay:** Targeting oncogenic EWS-FLI1:promoter condensates in Ewing sarcoma

**Tae-Hee Kim:** Investigating and targeting gastric cancer with H. pylori infection

**David Malkin:** The DNA methylation epigenetic clock as a bio-correlate of cancer risk in Li-Fraumeni syndrome

**Paul Nathan:** A novel method to evaluate bone health in survivors of paediatric acute lymphoblastic leukemia using high-resolution peripheral quantitative computed tomography

**Vijay Ramaswamy:** Long-term functional outcomes of children with medulloblastomas and ependymomas: A population-based, matched cohort study

**Neal Sondheimer:** The mitochondrial genomics of paediatric cancer

**Lillian Sung:** Development and validation of a consensus approach to child and parent reporting of the Symptom Screening in Paediatrics Tool (co-SSPedi)

**Uri Tabori:** Alteration of mutagenic gut microbiome for cancer prevention

**Jonathan Wasserman:** Total and microRNA-based diagnostics for pre- and post-operative treatment stratification of children and adolescents with thyroid masses and thyroid carcinoma

**Sue Zupanec:** Sleep and neurocognitive outcomes during paediatric ALL maintenance

**PROMISING NEW APPROACH TO STOP GROWTH OF BRAIN CANCER CELLS**

**DEVELOPING MICRO-ROBOTS FOR THE FUTURE OF NEUROSURGERY**

**STUDY FINDS CANCER SCREENING TOOL MAY HELP PREDICT RISK OF DEVELOPING A NEW CANCER AMONG CHILDHOOD CANCER SURVIVORS**

**UPDATING RISK CLASSIFICATION TO HELP TAILOR TREATMENTS FOR NEUROBLASTOMA GLOBALLY**



## A NOVEL APPROACH TO THE CHALLENGE OF RETINOBLASTOMA – LOCATION IS KEY

Retinoblastoma is a rare form of childhood cancer that originates in the retina. SickKids plays a crucial role as a national referral centre for the treatment of retinoblastoma patients, who require the care of a multi-disciplinary team that includes paediatric oncologists and specialist ophthalmologists.

Traditional retinoblastoma treatments have involved a wide range of approaches, including removal of the eye, radiation therapy, and chemotherapy delivered either systemically or through the arteries that feed the eye. None of these therapies is without significant side-effects and serious consequences which can negatively impact a patient's quality of life and, in some cases, lead to secondary cancers. To help kids with retinoblastoma, researchers are searching for novel methods of drug delivery and/or targeted agents with lower toxicity.

Through a collaborative effort led by Drs. Brenda Gallie, Daniel Morgenstern, Furqan Shaikh, and the Clinical Trials Support Unit, SickKids is running a ground-breaking Phase I study to evaluate the safety and efficacy of a novel chemotherapy delivery device, called a sustained-release topotecan episcleral plaque (or Chemoplaque) to treat retinoblastoma. The Chemoplaque is inserted in the patient's eye and delivers the chemotherapy right where it's needed. Patients with active residual or recurrent intraocular retinoblastoma in at least one eye following completion of first-line therapy are actively being enrolled in this study. The goal is to demonstrate that the use of this novel device will be safe and effective and will provide an important addition to the therapeutic toolbox for those caring for retinoblastoma patients from across Canada.

The study is being supported in part by the Great Cycle Challenge.

## GFCC VIRTUAL CANCER RESEARCH WEEK

As was the case with so many events over the last year and a half, the bi-annual GFCC Cancer Research Day required a different approach in 2021. The event was organized over portions of 3 days to avoid screen fatigue and included multiple lunchtime poster sessions and an afternoon of presentations that showcased the vast breadth of cancer research being driven by world-class trainees at SickKids. The week was capped off by a compelling virtual Keynote Address presented by Nobel Laureate, Dr. Bill Kaelin from Dana Farber Cancer Institute in Boston. Although the feedback from attendees and presenters was overwhelmingly positive, we hope we can all gather in person next time.

“This was just like being at a large scientific meeting. Work ranging from rare childhood lipoblastoma to adult tumors and from basic science to clinical trials...”

“ An amazing group of trainees who made this symposium possible”

“An impressive tour de force, with the wrap-up being a presentation by a Nobel laureate”



## GARRON CHAIRS IN CHILDHOOD CANCER RESEARCH: FROM DISCOVERIES TO RECOVERIES

### BRAIN REPAIR & REGENERATION

**Dr. Eric Bouffet**

Dr. Eric Bouffet and a team of researchers, including SickKids psychologist Donald Mabbot, have shown that metformin, a common drug used to treat type-2 diabetes, could one day be used to repair brain injury caused by tumours and the toxic therapies used to treat them. The study is a precursor for a clinical trial that can dramatically change the quality of life for patients and their families.

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“Until recently, little was being offered to children suffering the consequences of radiation treatment to their brains. This study suggests that we can repair some of this damage and that children with brain tumours worldwide may potentially benefit from this discovery.”

### NON-SURGICAL BIOPSIES

**Dr. Cynthia Hawkins**

When a patient is diagnosed with brain cancer, a biopsy of the tumour tissue helps clinicians identify the precise cancer and find life-saving personalized treatment options. But a biopsy requires brain surgery — very invasive, scary, and often fraught with postsurgical complications. Dr. Cynthia Hawkins and her team are bypassing the need for surgical biopsies with a first-in-children approach to gather a brain tumour’s DNA from a small sample of a patient’s cerebral spinal fluid using a straightforward lumbar puncture. This procedure is called a liquid biopsy, and its imminent clinical application will revolutionize protocol for diagnoses and treatment for kids with brain cancer and other kinds of cancers, too.

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It’s a game-changing opportunity for better outcomes. With it, we can better diagnose patients and follow them over time, predicting responsiveness to subsequent medications, especially in the case of relapse.”

### IMMUNOTHERAPY: HOPE AND HEALING

**Dr. Uri Tabori**

Paediatric glioblastoma (GBM) accounts for up to 15 per cent of primary central nervous system tumours in children and is the leading cause of death among this group. Despite treatment consisting of maximal surgical resection, radiation, and chemotherapy, the average survival rate is a mere 7 to 15 months, and the damage to the brain is often extensive. There is no standard treatment following recurrence. Since these cancers are universally hypermutated, Dr. Uri Tabori and team have published on the opportunity they seized to treat these tumours upfront using immunotherapy. The results are promising and the impact is unmeasurable – setting the stage for less toxic and more effective treatment of this horrible disease.

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“It’s one of the greatest accomplishments of my career. To treat children who we didn’t think we could help is incredible.”

### A NEW MODEL OF DISCOVERY

**Dr. Michael Taylor**

Dr. Michael Taylor and his team have found new ways to model ependymomas, one of the most common malignant paediatric brain tumours. They discovered that the tumours have enriched oxygen levels, which are associated with poor outcomes. The tumours also have specific DNA pathways critical to their survival. By studying how to keep these cells alive, Dr. Taylor and his team will identify drugs that target these pathways and eliminate the cancer cells for good. This work could form the basis for a new standard-of-care treatment.

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“The vast majority of children with recurrent metastatic medulloblastoma or ependymoma currently have a deadly prognosis, so it is very exciting to think we have identified a novel approach to treat this underserved patient population.”

### PERSONALIZED TRANSPLANTS FOR BETTER OUTCOMES

**Dr. Donna Wall**

When a child needs a stem cell transplant, they receive high doses of chemotherapy for a series of days to wipe out the blood-making system, only to rescue it with seeds from a new one. But the young blood-making cells make up only one to two per cent of the cells that become part of a patient’s new immune system. While chemotherapy has been very good at breaking down the tumour’s microenvironment – a protective shield it creates to hide from the immune system, it also causes terrible damage to the rest of the body. By figuring out what’s in the graft, Dr. Donna Wall and her team can program it to target tumor cells effectively without subjecting the patient to unnecessary harm.

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“We’re looking at over 50 markers on the young blood-making cells in the graft at the same time, and we’re getting a beautiful picture of what cells are in the graft and what state they’re in.”

## RESTRACOMP FELLOWS & STUDENTS

The GFCC has a long-standing and productive collaboration with the Research Training Centre to support graduate scholarships and postdoctoral fellowships for exceptional trainees engaged in cancer research at SickKids.

During 2020/21, the following trainees were funded or co-funded by the GFCC:

#### **Dr. Xin Chen, Postdoctoral Fellow**

Supervisor: Dr. Xi Huang  
Project: Mechanosensitive ion channels in cancer

#### **Dr. Victoria Forster, Postdoctoral Fellow**

Supervisor: Dr. Uri Tabori  
Project: Using human-derived models such as induced pluripotent stem cells and organoids to understand cancer predisposition syndromes

#### **Michelle Ly, Graduate Student**

Supervisor: Dr. Michael Taylor  
Project: Dissecting the differences between micro-metastases and macro-metastases in medulloblastoma

#### **Anson Sathaseevan, Graduate Student**

Supervisor: Dr. Brent Derry  
Project: Investigating the role of the RNA-binding protein CFIM-1 in the germline of *Caenorhabditis elegans*

#### **Jonas Yeung, Graduate Student**

Supervisor: Dr. Brian Nieman  
Project: Investigating neurocognitive late effects of acute lymphoblastic leukemia (ALL) chemotherapy.

#### **Zoya Aamir, Graduate Student**

Supervisor: Dr. Uri Tabori  
Project: Investigating Genetic Drivers of Replication Repair Deficient Tumours in Mouse Models

#### **Elizabeth Cox, Graduate Student**

Supervisor: Dr. Donald Mabbott  
Project: Development of a web-based exercise training program for brain repair and cognitive recovery for paediatric brain tumour survivors in the community: a feasibility study

#### **Dr. Palak Patel, Postdoctoral Fellow**

Supervisor: Dr. Cynthia Hawkins  
Project: Dissecting tumour microenvironment of paediatric brain tumours using single-cell multiomics: Finding molecular and cellular drivers of cancer invasion and treatment resistance

#### **Brianne Laverty, Graduate Student**

Supervisor: Dr. David Malkin  
Project: Diagnosing Li-Fraumeni syndrome from the somatic genome

#### **Ali Momin, Graduate Student**

Supervisor: Dr. Xi Huang  
Project: Defining the role of tissue stiffness in medulloblastoma

#### **Fupan Yao, Graduate Student**

Supervisor: Dr. Annie Huang  
Project: Delineating Inter and Intratumor Heterogeneity in Atypical Teratoid Rhabdoid Tumors

## TRAINING THE NEXT GENERATION OF CLINICIAN-SCIENTISTS

The GFCC is committed to training the next generation of physician, nursing, and other allied health scientists through an increasingly popular and recognized 2-year cancer research fellowship program. The program is quite competitive, awarding only two spots per academic year.

### PROFILES OF THE NEW 2021/2022 GFCC RESEARCH FELLOWS



**Dr. Hallie Coltin, Bank of Montreal (BMO) Financial Group Oncology Fellowship recipient**

Supervisors: Drs. [Paul Nathan](#) and [Vijay Ramaswamy](#)

**Long-Term Functional Outcomes of Children with Medulloblastomas and Ependymomas: A Population-Based, Matched Cohort Study**

Medulloblastomas and ependymomas are two common brain cancers in children. These cancers can only be cured with aggressive treatments such as brain surgery, chemotherapy, and radiation. Unfortunately, these treatments cause serious long-term health problems for the children who survive. These side effects can cause survivors to be hospitalized frequently or die early, but currently we do not know which children are at highest risk, and how to prevent this.

The goal of our study is to understand how often survivors develop these long-term side effects. The side effects we are most interested in are: early death, hospitalizations, new cancers, cardiovascular disease, severe mental health problems and dependent living. We will look at all survivors of medulloblastoma and ependymoma who were diagnosed in Ontario between 1985 and 2018 when they were less than 18 years old. Then we will use databases which contain healthcare use in all Ontarians to look at how often and when the survivors develop these side effects. We will compare these findings to a group of healthy Ontarians to see if the survivor group is at higher risk, and which treatments and factors increase the risk of these long-term consequences. This will represent the first population-based study to evaluate long-term health outcomes in children treated for medulloblastoma and ependymoma and provide us with a better understanding how often and why survivors develop these severe complications. Our goal is to improve the ways that we monitor for these health problems with the goal of preventing them.

“Being a part of the GFCC means I have the unparalleled opportunity to work and learn in a collaborative environment with the highest standard of excellence. I cannot thank the GFCC and my mentors enough for their support”



**Dr. Raizl Gruda Sussman, BMO Financial Group Oncology Fellowship recipient**

Supervisor: [Dr. Walter Khar](#)

**Determining the Importance of Platelet  $\alpha$ -granule Proteins in Promoting Cancer Metastasis and Immune Surveillance**

Platelets are small blood cells that play an important role in clot formation to prevent bleeding. This, and other platelet functions, such as aiding wound healing and revascularization, are facilitated by a large variety of proteins that are stored primarily in platelet  $\alpha$ -granules. These proteins are released when platelets encounter wounds and other stimuli.

Recent reports present evidence that platelets can play a prominent role in promoting tumor growth and spreading. Before reaching sites where they can form metastases, tumor cells circulate in the bloodstream, where they must survive blood shear forces and evade immune surveillance. Platelets have been observed to coat circulating tumor cells, apparently providing them with a physical shield that protects them from destruction. Platelets have also been shown to be capable of inhibiting immune cell attack. The mechanisms by which platelets protect and assist tumor cells are not well understood, but proteins secreted by platelets have been implicated.

We will study the interaction of platelets with tumor and immune cells using a model system that compares normal mice to those where platelets lack  $\alpha$ -granules and are thus incapable of secreting most platelet-borne proteins. This system will allow us to identify platelet proteins involved in key intracellular interactions. This information will support development of treatments targeted at preventing the spread of tumor cells, adding new weapons to the ongoing battle against cancer.

“Being part of the GFCC means that I will be part of a group of clinician scientists that all have the same goal – to better understand and treat childhood cancer. It is a great privilege”

## GFCC FAMILY AND EDUCATION EVENTS



### 13TH ANNUAL CHILDHOOD CANCER THERAPY UPDATE – FEBRUARY 3 AND FEBRUARY 10, 2021

This two-half-day symposium brings together national and international experts to share leading practices and applied science. The aim of the event is to achieve a thought-provoking, relevant and scientific meeting to advance paediatric oncology care locally, nationally, and internationally. Over 150 healthcare practitioners attended this year’s virtual event.



### “IT’S ALL ABOUT ME” SIBLING APPRECIATION DAY – JUNE 12, 2021

This annual event provides an opportunity to recognize the special role of siblings in the care and well-being of paediatric cancer patients. More than 100 children and their families attended this year’s virtual event.

### PHOTOVOICE – MAY 18, 2021

Photovoice is a therapeutic photography program focused on creating a supportive peer-focused environment aimed at bringing voice to teens with varying cancer diagnosis.

Watch below to hear the personal cancer stories and see the photographs shared by SickKids patients who participated in this year’s program. <https://youtu.be/bbt5-pdmAuQ>



# THE GFCC IS NOW ON TWITTER!

Connect with us on Twitter [@SickKidsCancer](#). Join in the conversation by using [#SickKidsCancer](#).



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