

2022

# Research at CancerCare Manitoba

*Care through Discovery*

Past  
Present  
Future



## Vision

A world free of cancer.

## Mission

To reduce and, where possible, eliminate the burden of cancer on the people of Manitoba through exemplary programs of prevention, diagnosis, treatment, rehabilitation, continuing care, research and education.

## Values

Respect for People  
Integrity  
Stewardship  
Excellence

## Equity, Diversity and Inclusion Commitment

CancerCare Manitoba is committed to a culture of Equity, Diversity and Inclusion in the delivery of care, and all of the organization's operations, including research and education.

### **Indigenous People**

Indigenous People have a special status and deserve a special commitment from CancerCare Manitoba in accordance with the Calls to Action of the Truth and Reconciliation Commission and the UN Declaration on the Rights of Indigenous People.

# Table of Contents

CCMB Vision, Mission, Values & EDI Statement .....	2	Message from the Rady Faculty of Health Sciences, University of Manitoba .....	56
Message from the President and CEO, CancerCare Manitoba .....	4	Message from CancerCare Manitoba Foundation .....	57
Message from CancerCare Manitoba’s Board Chair and Chair of the Research Committee .....	6	<b>Roadmap to Cancer Control for Manitoba</b> .....	58
<b>Building on the Rich Legacy of CancerCare Manitoba</b> .....	7	Research and Innovation Foundational to the Priorities of the Roadmap to Cancer Control	
<i>92 Years of Research in Manitoba</i>		<b>Members of CancerCare Manitoba Research Institute 2022</b> .....	60
<b>CancerCare Manitoba Research Institute 2021</b> .....	14		
<i>New Name and Governance</i>			
<b>Research Disciplines at CancerCare Manitoba Research Institute</b> ...	17		
<b>Platforms Supporting the Research Disciplines</b> .....	18		
<i>Manitoba Tumour Bank</i>			
<i>Next Generation Sequencing</i>			
<i>Cancer Modelling and Imaging Core</i>			
<i>Manitoba Cancer Informatics</i>			
<b>Strategic Focus of CancerCare Manitoba Research Institute</b> .....	24		
<b>Clinical Trials Unit</b> .....	25		
<b>Research Highlights</b> .....	26		
Multidisciplinary Research Teams			
Chronic Lymphocytic Leukemia (CLL) Research			
Working Together to Improve the Lives of Women Living with Ovarian Cancer			
Creating Innovative Treatments for the Deadliest Form of Brain Cancer			
A Potential New Way of Treating an Aggressive Form of T-Cell Leukemia			
Research and Innovation by the Radiation Oncology Team			
Investigator-Initiated Clinical Trials By the Hematology Research Team			
Pediatric Research at CancerCare Manitoba Research Institute			
Health Services Research			
CAR-T Therapy – Bringing Research to the Patient			
Dignity Therapy – Enhancing the Patient and Family Experience			
COVID-19 Research at CancerCare Manitoba Research Institute			
<b>Research Activities and Collaborations</b> .....	44		
<b>New and Innovative Investments for the Future</b> .....	50		
Single Cell Technologies			
Precision Medicine in Radiation Oncology by Bringing MRI to CCMB			
State-of-the-Art Research Laboratories for the Future			
Securing our Future			

# Message from the President and CEO, CancerCare Manitoba

*The cure for cancer comes through research.  
Every clinical advance has a rich history of research behind it.*

Cancer patients and their loved ones who walk through the doors of CancerCare Manitoba can know that research is an integral part of what we do, and they can be assured of the best treatment available in our comprehensive cancer centre where scientists pursue state-of-the-art research.

Embedding research into all aspects of cancer control is an essential component of CancerCare Manitoba's mission to reduce the impact of cancer on the lives of Manitobans.

The benefits of the Research Institute's co-location with clinical cancer care are wide-ranging:

- Patients have access to clinical trials
- Scientists are connected with the global research community bringing innovation and the latest treatments to CCMB
- Researchers work hand in hand with clinicians providing comprehensive care
- Scientists have an enhanced understanding of patient needs

Our commitment has a long history. For nine decades, CancerCare Manitoba has been dedicated to pursuing scientific discovery to improve patient care. Our founders had the vision and knew the importance of research to advancing care and improving outcomes.

We are indebted to those visionary individuals who laid the groundwork for research, a foundation we continue to build on today. The legacy continues.

CancerCare Manitoba has legislated responsibility for conducting cancer and blood disorder research. CancerCare Manitoba Research Institute is governed by CancerCare Manitoba and is closely affiliated with the University of Manitoba. It is the only provincial research institute exclusively dedicated to improving cancer control and outcomes in Manitoba through research and innovation.

CancerCare Manitoba Research Institute (CCMR) is a world-class centre with the distinct advantage of being located within a patient-care facility. This proximity benefits both research and patient care, and in turn, attracts internationally renowned scientists to serve Manitobans.

In this document, you will read about the unique history of cancer research in Manitoba and our scientific contributions, past and present. It also describes the excellent opportunity our current environment presents to build on and expand our research legacy.

Our success is possible because of Manitobans who support cancer research through their generosity. I am grateful for our donors' insight, forward-thinking and vision in recognizing and contributing to the high quality of cancer care Manitobans deserve. I offer my sincere gratitude to the CancerCare Manitoba Foundation and its Board of Directors for their unwavering loyalty.

I am also grateful for the diligence of the CCMB Board's Research Committee in ensuring good governance and best practices and the contributions of national leading scientists on our Scientific Advisory Board.

My sincere appreciation goes to the Board of Directors of CancerCare Manitoba for their leadership, investment of time, and dedication to the people of Manitoba.

I also want to acknowledge and thank the Institute's Interim Leadership Team for its steadfast commitment to continuing the legacy of cancer research while we are recruiting the next leader of the Research Institute. My gratitude goes to Dr. Jody Haigh, Dr. Kirk McManus, Dr. Sara Israels, Dr. Boyd McCurdy, and Dr. Marshall Pitz.

Through my professional journey, I have grown to appreciate the benefits of clinical and research integration,





which brings the best evidence-based, high-quality care for our patients. This is what brought me to CancerCare Manitoba, an institute with a strong mandate for research. My current role as CEO has provided me with the platform to advance and expand our rich research legacy to bring the best care to Manitobans.

I am proud of our progress and I am enthusiastic about our goal: to be one of the best research institutes in Canada. Scientific excellence and the dedication of our scientists are inspiring as we work to bring advanced discovery to patients.

Sri Navaratnam, MBBS, PhD, FRCPC  
President and CEO, CancerCare Manitoba  
Professor, Department of Internal Medicine,  
Rady Faculty of Health Sciences, University of Manitoba

*“Our drive for scientific research excellence is born from our passion to serve the people of Manitoba.”*

# Message from the CancerCare Manitoba Board

*We share in CancerCare Manitoba's commitment to continue investing in research for the future of Manitobans.*



I applaud CancerCare Manitoba and its Research Institute for creating this publication that provides the storied history and recent achievements of cancer research in Manitoba.

CCMB is the legislated cancer authority for the province. Along with its responsibility to set the strategic plan for cancer service delivery throughout the province, it holds the responsibility to conduct cancer research. In fact, for nine decades, it has been dedicated to pursuing scientific discovery to improve patient care.

Through the work, dedication, and leadership of our President and CEO, Dr. Sri Navaratnam, a new governance structure for CancerCare Manitoba Research Institute was announced in 2021, bringing research closer to patient care while maintaining our close ties and affiliation with the University of Manitoba. The new structure included the formation of a Research Committee of the Board, which provides governance as well as a robust Scientific Advisory Board with membership from research leaders from across Canada who provide strategic advice to the Research Institute.

On behalf of the Board, my sincere thank you to the researchers who work every day to bring our mission to life. Your work and support for people facing cancer are essential.

Jeoff Chipman  
Board Chair

It is a great privilege to be the inaugural Chair of the Research Committee of the CancerCare Manitoba Board.

When I joined the Board, I knew CCMB had an unfailing focus on the well-being of cancer patients. I also knew its Research Institute had a world-class reputation for the quality of its people and its work. Reflecting now, I recognize the synergy of these operations has never been so vital.

We can be proud of the cancer research carried out in our province. We can look forward to a strong future, with a renewed commitment to focused research excellence and where the needs of Manitobans are foremost. CancerCare Manitoba Research Institute, a long-standing cornerstone of CCMB, will no longer be a hidden jewel, but a vibrant, world-renowned collaborator and recognized health and economic driver. Looking forward, in collaboration with the University of Manitoba and with the support of CancerCare Manitoba Foundation, we will continue to build with foresight and confidence.

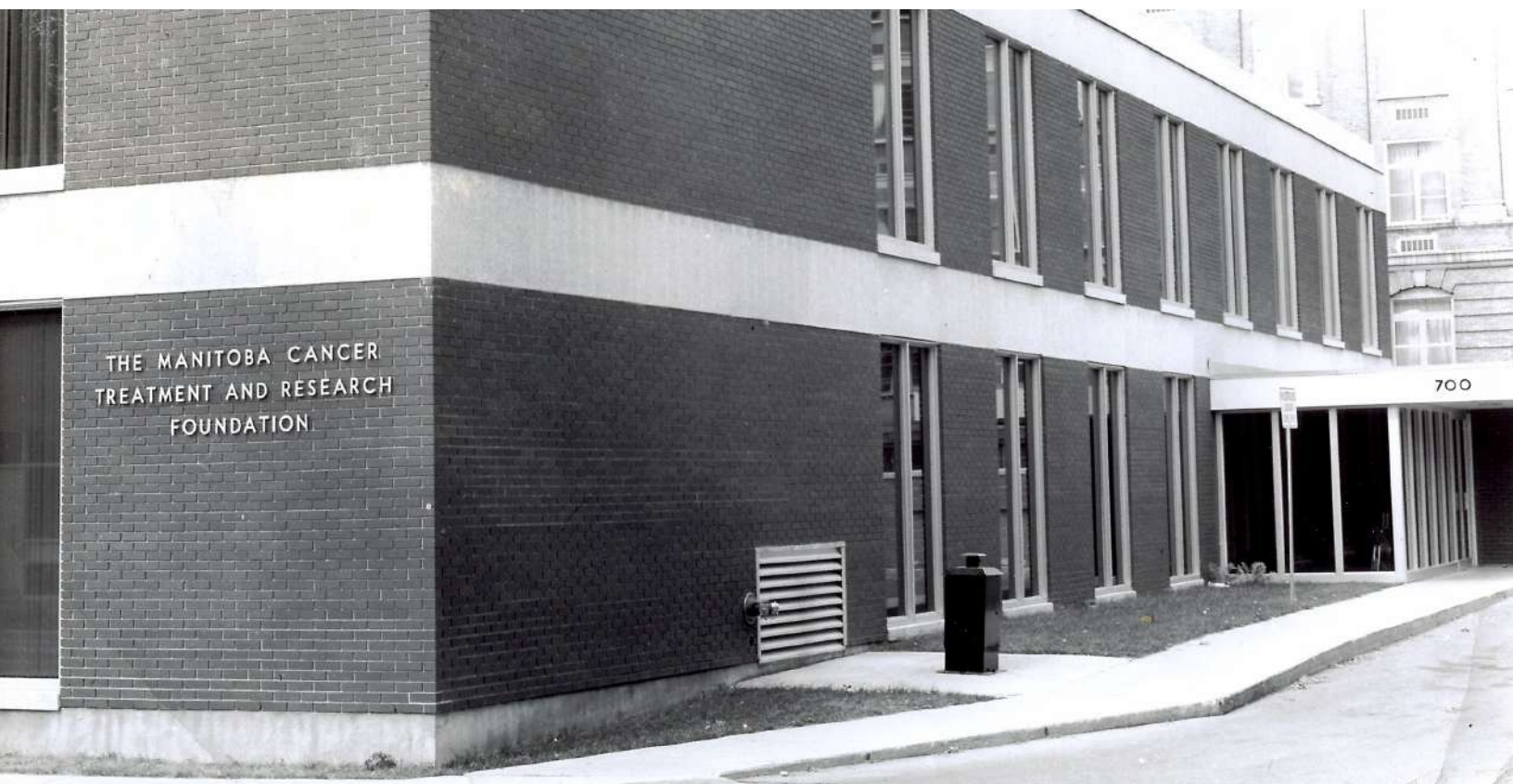
I am delighted this publication showcases the rich history - and teases out the future - of cancer research in Manitoba.

Jan Belanger  
Chair, Research Committee of the Board

# Building on the Rich Legacy of CancerCare Manitoba







Construction of the Manitoba Cancer Treatment and Research Foundation building at the corner of Olivia Street and McDermot Avenue in the early 1960s.

# Research has been part of CancerCare Manitoba since the 1930s

## *Dr. Lyonel G. Israels - An Innovative Leader*



Dr. Lyonel G. Israels was an innovative leader in cancer and blood disorders research in Manitoba. He created and led the Manitoba Institute of Cell Biology from 1969 to 1972, considered to be one of the foremost cancer research facilities in Canada. He went on to serve as the Executive Director of Manitoba Cancer Treatment and Research Foundation for 20 years, from 1973 to 1993. During these years he also served as the Head of the Section of Hematology/Oncology, Department of Internal Medicine, University of Manitoba. Some of his many other accomplishments include:

- First hematologist/oncologist to treat CLL patients with chlorambucil in Canada
- Led the development of hematology textbooks used around the globe
- Played a leading role in founding the Manitoba Health Research Council (MHRC)
- World-renowned researcher - published in NEJM, Science, Nature and The Lancet
- Received the Order of Canada in 1994

When Manitoba's cancer services establishment was created 90 years ago, it was named the Manitoba Cancer Relief and Research Institute. This was the first of its kind in the country. As early as the 1930s, research was at the forefront of the establishment such that it was included in our name. The goal was to bring life-saving innovation from research labs into the home and hearts of Manitobans. To further enhance research efforts, the Central Cancer Registry was established in 1937 and is still the source of ongoing significant national and international research. Today, the Manitoba Cancer Registry consistently meets the gold standard for its quality.

Two decades later in 1957, this cancer establishment was legislated by the government of Manitoba and was given the name Manitoba Cancer Treatment and Research Foundation (MCTRF), succeeding the Cancer Relief and Research Institute. This was a milestone for cancer research in Manitoba as the government recognized the significance of research in the treatment of cancer while acknowledging the need for external funding and philanthropy to support the work. Manitobans have continued to generously support research at CancerCare Manitoba.

The Manitoba Institute of Cell Biology (MICB) was formed in 1969 to elevate and give significant attention to cancer and blood disorder research and was physically located within MCTRF. Created by CancerCare Manitoba's innovative

leader, Dr. Lyonel G. Israels, the humble beginnings of the institute brought together just five researchers, whose primary work until then had been hematology, with only \$19,000 in operating grants. These researchers faced the task of studying cells at the molecular level with the hope of improving outcomes for patients suffering from both blood disorders and cancers.

The MICB was governed jointly by MCTRF and the University of Manitoba. This provided us with a close partnership with the University, increased our profile, and enhanced our ability to attract external national funding sources. For the first time, basic and translational laboratory research in cancer and blood disorders was under the joint purview of the Manitoba Cancer Treatment and Research Foundation and the University of Manitoba.

Three decades later, in 1999, for operational purposes, the Foundation was separated and the MCTRF went through a name change to CancerCare Manitoba (CCMB) and CancerCare Manitoba Foundation (CCMF). The MICB continued as a joint institute of CCMB and the University of Manitoba. A new CCMB patient care facility was built, and, through the significant generosity of donors, two floors were built to house cell biology research laboratories. This further advanced research during this time by focusing and centralizing core researchers, competencies and equipment.

Cancer research has evolved nationally and internationally over the years. Research has expanded to encompass basic and translational, clinical, health services, clinical trials and population (patient experience) research. Cancer research now looks not only at the cell level of cancer but at the entire patient journey from diagnosis to end of life. This was reflected in Manitoba as well.

While the MICB laboratories were focusing on cell biology research, other areas of research were occurring elsewhere in CCMB, primarily in the Clinical departments, Epidemiology and Medical Physics.

To advance and consolidate all areas of research and to improve the multidisciplinary team approach of varied

disciplines coming together, a decision was made in 2015 to form the Research Institute in Oncology and Hematology (RIOH). The infrastructure of RIOH facilitated the multidisciplinary approach – the way forward for research advancement. Through this approach, research questions can be investigated more comprehensively with discoveries brought to patient care in a timelier fashion.

The Research Institute in Oncology and Hematology was formed as a joint institute with the University of Manitoba. Dr. Arnold Naimark, Chair of the CCMB Board and President, of the University of Manitoba, and Dr. Digvir Jayas, Vice President of Research and International, University of Manitoba, were instrumental in working with CCMB to form the new Research Institute.

## *Directors of the Manitoba Institute of Cell Biology through the years*

---



**Dr. L.G. Israels, CM, MD, FRCP(C), DSC  
(honorary) University of Manitoba**  
1969-1972



**Dr. G.J. Goldenberg, MD, PhD**  
1973-1988



Two co-leads were appointed with the establishment of RIOH: Dr. Spencer Gibson as Lead of Cell Biology Research, and Dr. Marshall Pitz as Lead of Clinical Research. Dr. Sri Navaratnam, President and CEO, of CancerCare Manitoba, took on the role of Acting Director of Research while recruitment efforts for this role were in process.

With over 50 years of successful and established laboratory research focusing on cell biology for cancer and blood disorders, there was a strong foundation for the new Research Institute in Oncology and Hematology to bring together all research and researchers.

The next milestone came in 2021 when there was keen interest in tying our research to the CancerCare Manitoba name and bringing research even closer to patient care. The CancerCare Manitoba Research Institute was created.



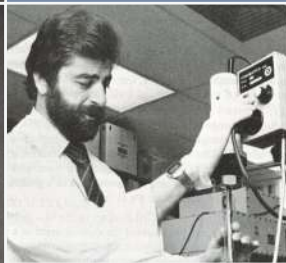
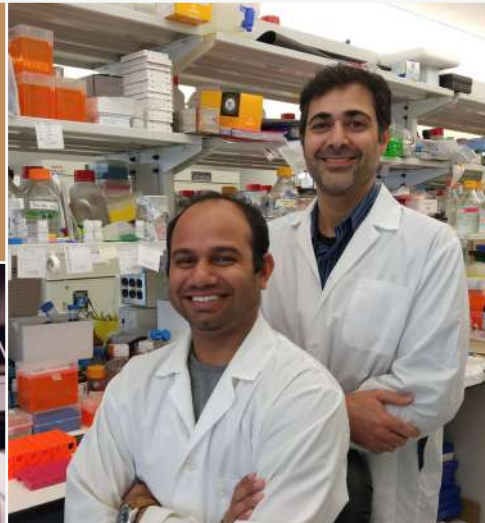
**Dr. A. Greenberg, MD, PhD**  
1988-1999



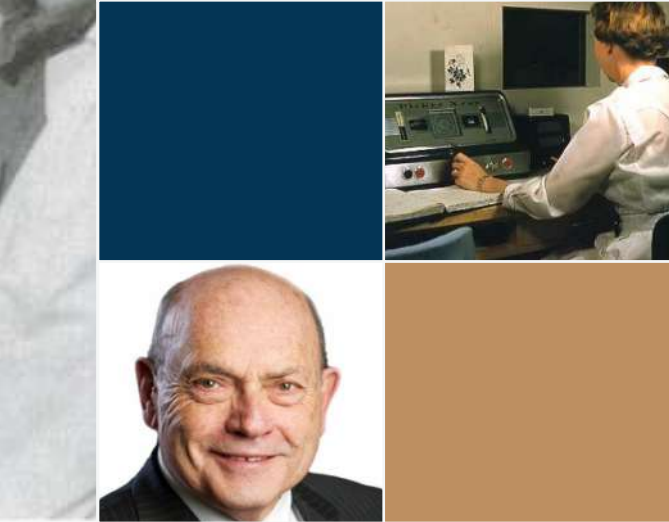
**Dr. J. Davie, PhD**  
2000-2008



**Dr. S. Gibson, PhD**  
2011-2015



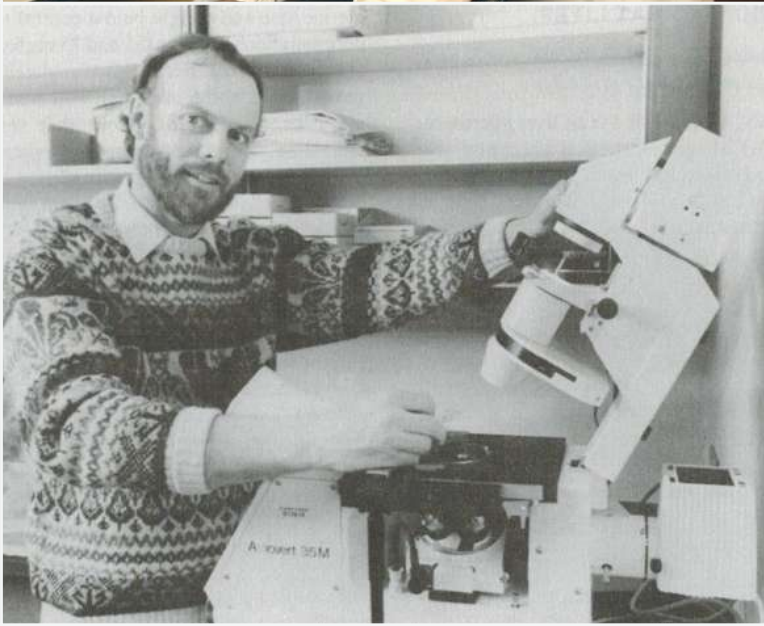
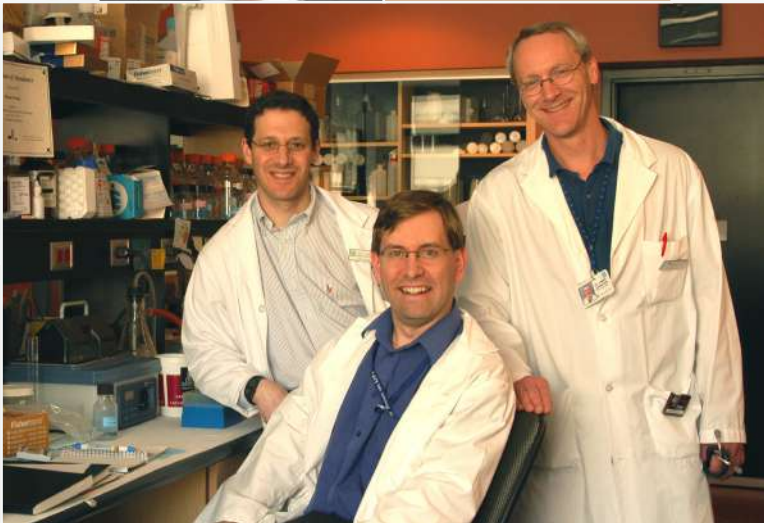




92

OF RESEARCH  
IN MANITOBA

YEARS





# CancerCare Manitoba Research Institute 2021

*A new era*

## Vision

Recognized nationally and internationally as a leading research institute for cancer and blood disorders, we strive for excellence to provide world-class care for all Manitobans.

## Mission

We achieve research excellence by integrating disciplines through multidisciplinary teams from basic sciences to translational, clinical and health services to patient experience. Manitobans receive the best possible care as we deliver on our commitment to *Care through Discovery*.



Affiliated with the University of Manitoba



# New Name and Governance CancerCare Manitoba Research Institute

The most recent transformation in our research history occurred in May 2021, with the celebration of a new name and governance structure. CancerCare Manitoba Research Institute (CCMR) was announced, bringing research even closer to patient care and tying research to the CancerCare Manitoba name. CCMB and the University of Manitoba reached an agreement to move the Institute from joint governance to sole governance by CancerCare Manitoba while maintaining our strong affiliation and enduring partnership with the University of Manitoba.

The new name, from Research Institute in Oncology and Hematology to CancerCare Manitoba Research Institute, with the tagline Care through Discovery, underscores the benefits of research to patient care and our commitment to the people of Manitoba.

## Virtual announcement of CancerCare Manitoba Research Institute in May 2021



Dr. Sri Navaratnam,  
President & CEO,  
CancerCare  
Manitoba



Dr. Neil Watkins,  
Chief of Research,  
CancerCare  
Manitoba



Dr. Digvir Jayas,  
VP Research and  
International,  
University of  
Manitoba



Dr. Brian Postl,  
Dean of Medicine,  
University of  
Manitoba



Mr. Steve Kroft,  
Board Chair,  
CancerCare  
Manitoba  
Foundation



Mr. Jeoff Chipman,  
Board Chair,  
CancerCare  
Manitoba



## RESEARCH NEWS



*Dr. Neil Watkins, CCMB Chief of Research and Director of the Research Institute from June 2019 to April 2022, brought energy and momentum to CCMR during his two years with us. He was instrumental in fostering change and renewal, including the rebranding with a new name and governance structure. Through his role, he strengthened and raised the profile of cancer research in Manitoba as well as nationally and internationally.*

To support the governance structure, a new **Research Committee of the Board** was formed. The membership includes:

- Jan Belanger**, Chair and CCMB Board member
- Jeffrey Chipman**, CCMB Board of Directors Chair
- Dr. Sri Navaratnam**, President and CEO, CCMB (ex-officio)
- Chief of Research**, to be appointed
- Brent Gibson**, Chief of Corporate Services and Finance, CCMB
- Dr. Joel Gingerich**, Medical Director, Clinical Trials Unit, CCMB
- Dr. Mario Pinto**, VP Research and International, University of Manitoba
- Patti Bell**, Board member
- Don MacDonald**, community member
- Patti Smith**, President and CEO, CancerCare Manitoba Foundation
- Lee Meagher**, CancerCare Manitoba Foundation, Board of Directors Chair
- Dr. Helmut Unruh**, Chair of the Scientific Advisory Board (ex-officio)
- Dr. Peter Nickerson**, Dean of Rady Faculty of Health Sciences, University of Manitoba

An external **Scientific Advisory Board** was created to provide strategic advice. The membership includes:

- Dr. Helmut Unruh (Chair)** - a retired Thoracic Surgeon with a long history, including with CCMB and the University of Manitoba
- Dr. Gerald Batist** - Director, Dept. of Oncology, Sir Mortimer B. Davis -Jewish General Hospital Director, McGill University Centre for Translational Research in Cancer; Professor, Department of Oncology, McGill University, Montreal
- Dr. Christine Williams** - Deputy Director and Head, Clinical Translation, Ontario Institute for Cancer Research (OICR), Toronto
- Dr. Stuart Peacock** - Professor, Simon Fraser University, Co-Director, Canadian Centre for Applied Research in Cancer Control (ARCC) and Head of Cancer Control Research, BC Cancer, Vancouver
- Dr. Donna Senger** - Professor, McGill University and Lady Davis Institute for Medical Research, Jewish General Hospital, Montreal
- Dr. Jennifer Chan** - Director, Arnie Charbonneau Cancer Institute and Associate Professor, Department of Pathology & Laboratory Medicine, University of Calgary

Today, with CCMB as the cancer authority for the province, our alignment with provincial health system transformation, our new governance structure, novel technologies and the recruitment of new scientists, and advances in research activity, there is renewed energy and opportunity driving research excellence.

Research is now more integrated and woven into the fabric of what we do at CancerCare Manitoba such that patients can have the confidence when they walk through our doors, that they are receiving the best cancer treatment available because research is happening very close to them. The care they receive is driven and informed by research and innovation. That is exciting!



# Research Disciplines at CancerCare Manitoba Research Institute

## **BASIC (LABORATORY) AND TRANSLATIONAL RESEARCH**

Research focusing on the understanding of how cells function, how cancer starts, grows and spreads, and then translating these results into improved treatments and therapies for patients with cancer and blood disorders.

## **CLINICAL RESEARCH**

Studying promising treatments, new technology and other clinical interventions in people as part of clinical studies.

Focuses include:

- Investigator-initiated clinical trials
- Hematology
- Radiation oncology
- Improving patient experience
- Clinical Trials Unit\*

\*not operationally part of CCMR

## **PATIENT**



## **HEALTH SERVICES RESEARCH**

Investigating the structure, processes, and effects of health care services.

Focuses include:

- Outcomes Research
- Health Equity Research
- Data Science Research

# Platforms Supporting the Research Disciplines

A person wearing a white lab coat and gloves is leaning over a rack of small, square samples in a laboratory. The background is a blurred laboratory setting with a large piece of equipment on the right. The entire image has a blue tint.

*Platforms provide services, equipment, data, animals and expertise to researchers. Together, these platforms support all research disciplines conducted by members of the Institute, from basic to translational to clinical research, including clinical trials and health services research.*



# Manitoba Tumour Bank as a Research Platform

The Manitoba Tumour Bank (MTB) is a core biobank facility with an established collection of human cancer-related tissues, other biospecimens and related clinical data. MTB is situated in the Cancer Care Manitoba Research Institute and operates with the approval of the University of Manitoba Research Ethics Board. The bank is certified by and is a founding member of the Canadian Tissue Repository Network, ensuring the quality control of this operation. The bank was established in 1993 initially as a breast tumour bank and expanded its mandate to include additional solid tumours and leukemia in 2006.

Today, the current inventory consists of over 21,000 collections on over 10,000 consented patients totalling over 100,000 individual samples. These are representative of chronic lymphocytic leukemia, acute leukemia, breast cancer, prostate cancer, lung cancer, ovarian cancer, multiple myeloma, head and neck cancer, and a small percentage of each of colon cancer, hairy cell leukemia, lymphoma, myelodysplastic syndrome (MDS), as well as healthy control samples.

The different types of biospecimens collected include tumours and associated normal tissue, blood, bone marrow, urine, buccal and ascites. Other services offered are tissue microarray construction, tissue block sectioning, antibody optimization, immunohistochemistry, and scoring.

In 2022, Dr. Sachin Katyal became the Director of the Manitoba Tumour Bank. MTB provides essential support for the acquisition, storage, processing, and distribution of blood and tissue samples. With a well-curated and clinically annotated biobank repository, it provides a critical research service for researchers at CCMR, the University of Manitoba, across Canada and internationally, having supported hundreds of research studies across North America, Europe and Australia. Since 2015, MTB has directly supported over 10 research projects annually, resulting in 10 to 15 peer-reviewed publications each year.

## *Dr. Leigh Murphy, a leader for women in science*



Director of the Manitoba Tumour Bank from 2006 to 2022, and Interim Director of MICB from 2009 to 2010.

Dr. Leigh Murphy has contributed to cancer research in Manitoba through her long and illustrious career as an accomplished scientist at CCMR. She is a Senior Scientist at the CancerCare Manitoba Research Institute and a Distinguished Professor in the Department of Biochemistry and Medical Genetics, at the University of Manitoba.

Dr. Murphy's research is focused on breast cancer and the activity of estrogen receptors (ER) in breast cancer cells, the target of treatment and prevention options in breast cancer. Accurately predicting if and when breast tumours will respond to treatment allows for the development of personalized approaches to cancer diagnosis and treatment to ensure the best possible outcome for breast cancer patients.

Dr. Murphy's important contributions to breast cancer research led to international collaborations and highlighted the importance of biobanking. This led to the establishment of breast tumour banking and the Manitoba Tumour Bank.

Dr. Murphy has been a mentor and leader for women in science and research for many years. In 2022, she retired from her roles at CCMR while continuing to mentor and teach young students at the University of Manitoba.



# Next Generation Sequencing as a Platform

*Delivery of the right care to the right patient - at the right time*

Genomic sequencing is key to precision medicine. Precision medicine allows for medical decisions to be based on the unique genomic composition of cells. Specific genes can confirm a patient's current disease, predict the possibility of future diseases, prognosticate disease behaviour, and predict treatment effectiveness. Personalized medicine has the potential to deliver the right care, to the right patient - at the right time. The optimal delivery of personalized medicine requires the implementation of precision medicine: the tailoring of diagnostics and therapeutics to individuals based on their unique genetic and molecular characteristics.

Every jurisdiction in Canada is struggling with the growing need for molecular testing required for clinical genomics and the implementation of personalized medicine. Manitoba is in a unique position within the Canadian landscape by having a single provincial cancer authority in CancerCare Manitoba, and a unified molecular testing service provider Shared Health Manitoba. Since 2016, these two provincial agencies

have worked under the generous support of CancerCare Manitoba Foundation funding to develop genomic capacity in Manitoba.

In 2021, CCMB and Shared Health announced the official opening of the Genome Sequencing Laboratory located within CancerCare Manitoba Research Institute. This laboratory analyzes the genetic and molecular makeup of cells from cancer patients. Results from the analysis are then used to select a treatment that specifically targets a patient's type of disease, thereby providing Manitobans with access to cutting-edge, innovative therapies to fight cancer right here in Manitoba. Genome sequencing can have a significant positive impact on outcomes for patients by informing more effective and predictable cancer treatment options. This state-of-the-art facility has also opened a new avenue to advance cancer research right here in Manitoba. Dr. Banerji, Senior Scientist and Clinician, is leading the Next Generation Sequencing as both a clinical and research platform.



Dr. Beth Spriggs and Dr. Shantanu Banerji, Co-Directors of the Genome Sequencing Laboratory



*The opening of the Genome Sequencing Laboratory at CancerCare Manitoba Research Institute was announced on March 30, 2021, bringing precision medicine and genetic testing to Manitobans. The Laboratory is an excellent collaborative effort between CCMB and Shared Health Diagnostic Services. Donor generosity through CancerCare Manitoba Foundation made the Lab a reality in our province. L to R: Dr. Sri Navaratnam, President and CEO, CCMB; Dr. Amin Kabani, Medical Lead, Shared Health Diagnostic Services; and Annitta Stenning, President and CEO, CancerCare Manitoba Foundation (until March 2021).*

*“Next Generation Sequencing advances the genomic understanding of cancer. This has become a cornerstone of precision medicine in oncology.” - Dr. S. Navaratnam*



# Cancer Modelling and Imaging Core as a Research Platform

The ability to study cancer development in the context of a whole organism is essential for our understanding of how cancers develop and spread. It is equally as important in the development of novel cancer therapies that may subsequently be used to effectively treat cancer patients. Cancer modelling in the mouse has and will continue to lead the way in our understanding of cancer biology and the development of novel cancer therapeutics. Dr. Jody Haigh, Senior Scientist at CCMR, is leading this platform.

The CancerCare Manitoba Research Institute has refurbished and expanded its mouse housing capacity with state-of-the-art SPF-IVC (Specific Pathogen-Free Individually Ventilated Caging) infrastructure.

In 2020/21, Dr. Jody Haigh, and his research team, in collaboration with the University of Manitoba, began to breed their own immunocompromised NSG (NOD-scid IL2R $\gamma$ manull) mouse colony within the expanded mouse facility. This mouse colony provides researchers fast,

efficient, and economical access to immune-compromised mice for patient-derived tumour cell xenotransplant (PDX) studies as well as for other studies using these mice aimed at avoiding immune cell-mediated rejection of transplanted cells. NSG mice are available to researchers at a reduced cost as compared to those from commercial sources.

The underlying goal of this platform is to enhance translational cancer research and enable future top-level publications and in turn, increased national grant funding success. Overall, these initiatives will form the basis of pre-clinical translational activities at the Research Institute whereby basic research findings can be validated in cancer-relevant models that are expected to enhance competitiveness in obtaining external research funding from national and international funding bodies and ultimately in the design of new drug-based clinical trials that can improve clinical outcomes for cancer patients.



# Manitoba Cancer Informatics as a Platform

Patient data is scattered across many disconnected systems and often buried within clinical notes. This requires lengthy manual processes to collect the data into one location, and to find complex outcomes, such as how well a treatment works and how well the patient can tolerate the treatment, that are not captured at the point of care in a measurable fashion. In addition, many forms of patient information are very complex, containing more information than can be analyzed by a human. Often, advanced computer-based analysis is required.

The Manitoba Cancer Informatics Platform team, led by Dr. Marshall Pitz, Senior Scientist at CCMR and Chief Medical Information Officer, is designing and implementing a data solution to ensure extremely high-quality data is integrated and available to all CancerCare researchers. The platform team is working to collect and organize clinical information from multiple sources so that it can be more easily analyzed by conventional statistics and enable the use of modern data science techniques such as machine learning (ML) and artificial intelligence (AI) in our research. Access to structured and curated clinical data with the breadth, depth, and history that will be available is a unique resource for scientists. Linking this data with pathology, radiology, laboratory, and multi-omic data will build capability in precision medicine research.

This has been beyond the reach of individual researchers and has limited both the type of research that can be done and the ability to translate this research into better patient treatments and care. The goal of the platform is to improve



the impact and translational relevance of all research activities at CancerCare Manitoba. This Platform will continue to support research within the Institute, in concert with ongoing support through the Institute's Research Office and CCMB's Department of Epidemiology.

As a result of directed funding, we expect to develop a modern, integrated research data infrastructure that will support ongoing research and enable advanced data and translational science research.



# Strategic Focus of CancerCare Manitoba Research Institute

The Research Institute organized a two-day strategic planning session in 2018 where over 100 appointed scientists, staff, CCMB clinicians and CCMB Department Heads joined external stakeholders from CancerCare Manitoba Foundation (CCMF), Shared Health, Research Manitoba and the University of Manitoba. The goal of the retreat was to identify research priorities to guide the Research Institute's direction for the coming five years. The retreat included a keynote address by Dr. Stephen Robbins, Scientific Director for the CIHR Institute of Cancer Research, who also participated in the discussions. Consensus on research priorities was reached and investment in infrastructure was identified for the next five years, with the next strategic exercise to occur in 2023.

Three major strategic directions were identified:

## **Developing Multidisciplinary Teams**

Multidisciplinary teams promote research excellence by building partnerships between clinical and academic partners at CancerCare Manitoba (CCMB), Shared Health, Regional Health Authorities, and the University of Manitoba (UofM). Significant progress has been made in establishing strong multidisciplinary teams in chronic lymphocytic leukemia (CLL), ovarian cancer, brain tumours, acute leukemias, myelodysplasia, and adolescent & young adult (AYA) cancer research. This progress is exciting and will directly benefit the people of Manitoba.

## **Enhancing Infrastructure Platforms**

The Institute's central research platforms provide services, equipment, animals, data, and expertise to all Members. Together, the platforms support all research disciplines conducted by Members of the Institute, from basic to translational to clinical research including clinical trials, as well as health services research. In the last 5 years, new critical research platforms have been introduced. These include the Manitoba Cancer Informatics platform, the Next Generation Sequencing laboratory, and the Cancer Modeling and Imaging platform. We look forward to establishing new single-cell technology in the near future.

## **Identifying Research Themes**

Identification of research themes such as early detection, precision medicine, and healthcare innovation will maximize return on investment. Flexibility will be essential to adapt to the rapidly changing cancer research landscape. At present we are focusing on precision medicine, early detection and healthcare innovation.

# Clinical Trials Unit

## *Bringing tomorrow's treatment to patients today*

CancerCare Manitoba (CCMB) is legislated by provincial law to facilitate and conduct research so that patients with cancer or blood disorders in Manitoba can gain access to advanced technology and treatments earlier. The goal of the Clinical Trials Unit (CTU) is to provide “tomorrow’s treatments today” to every eligible Manitoba patient with cancer or a blood disorder in Manitoba.

The CTU was established in the late 1960s and has a strong track record of participating in state-of-the-art local, national, and international clinical trials. Over the years, the CTU participated in phase I, phase II, and phase III studies from industry, academic cooperative groups, and local investigator-initiated trials. Since clinical trials are conducted primarily to improve patient outcomes over standard-of-care treatments, a major advantage of clinical trial participation is that all future patients benefit from the knowledge gained by past clinical trials. Since CTU’s inception, CCMB in partnership with its patients has participated in many studies that directly improved the survival and quality of life of Manitobans suffering from cancer or blood disorders.

The CTU consists of a dedicated team of more than 40 individuals working on clinical trials identified by physicians and Disease Site Groups at CCMB. The CTU staff completes and maintain regulatory documents, collect patient data and biospecimens, and provide research-focused nursing care. Throughout the process, meticulous documentation is required. The majority of studies currently active in our portfolio are phase II and III studies from industry and academic cooperative groups. Through access to clinical trials, patients are provided with the opportunity to access cutting-edge treatments that would not otherwise be available.



Kathryn Dyck, Manager, and Dr. Joel Gingerich, Medical Director, CTU

An example of a clinical trial in our portfolio evaluating a state-of-the-art treatment is the study: “Anti-Thymocyte Globulin and Post-Transplant Cyclophosphamide to Prevent Chronic Graft versus Host Disease-Study CTTC 1901”.

This is a multi-institution Canadian study that is co-led by Dr. Kristjan Paulson, a CCMB physician. This study is evaluating whether adding Cyclophosphamide to Anti-Thymocyte Globulin decreases the risk of graft versus host disease (GVHD) in patients with acute myeloblastic leukemia or myelodysplastic syndrome treated with a matched donor hematopoietic cell transplant.

GVHD can be a painful and debilitating condition that occurs after a hematopoietic cell transplant. This study will provide insight that may lead to better treatment options and improved quality of life for patients with GVHD. Since this study opened in February 2022, six Manitoba patients have already participated.



# Research Highlights

*Building on a legacy of life-saving research for over 90 years, research at CancerCare Manitoba has played a key role in advancing cancer treatment, saving countless lives and benefiting thousands of Manitobans. We've come so far and we will go much further.*

*These Research Highlights outline areas of strength and progress we have made in recent years.*



# Multidisciplinary Research Teams

## *Necessary for Success*

The unique ability of scientists and physicians to seamlessly collaborate and share insights in an ongoing cycle of innovation is what makes the environment at CCMR very suited to drive advances in research and care. These researchers come together from different disciplines; multidisciplinary research teams focusing on a specific disease site is the way forward for research success.

Through the development of multidisciplinary teams, findings from the lab can be rapidly translated to the bedside by leveraging established research platforms and programs.

At CancerCare Manitoba Research Institute, multidisciplinary research teams have been developed. This report highlights three multidisciplinary teams focusing on Chronic Lymphocytic Leukemia (CLL), and ovarian and brain cancers.

*“Linking Laboratory and clinical research is essential to understand why cancers progress and to develop new types of treatment.”*

*- Dr. James Johnston, Clinician Scientist, CancerCare Manitoba, CancerCare Manitoba Research Institute*

# Chronic Lymphocytic Leukemia (CLL) Research

*Then and Now: The Chronic Lymphocytic Leukemia translational research program is the first CLL-focused multidisciplinary team at CancerCare Manitoba and in Canada*

The Manitoba Chronic Lymphocytic Leukemia (CLL) translational research program is a forerunner in CancerCare Manitoba's commitment to research-driven evidence-based high-quality care for Manitobans. The CLL multidisciplinary research and clinical team serves as a guiding model for other cancer research clusters, particularly in other hematologic malignancies, incorporating basic scientists, clinicians, and epidemiologists to improve outcomes for Manitobans and Canadians suffering from cancer. The innovative CLL team focuses on patients with one of the most common but incurable forms of leukemia. Current research priorities include understanding the biology of CLL, overcoming drug resistance, and examining new treatments through clinical trials and health outcomes.

Dr. James Johnston, a hematologist at CCMB and clinician scientist at CCMR and Professor and Senior Scientist at CCMR, and Dr. Spencer Gibson were instrumental in providing leadership and creating the CLL Translational Research Program. Together they established the foundation to build and grow this successful program with funding support from our Foundation, the provincial government, industry partners and various national grant-funding agencies. Through its successes, this distinctive program continues to evolve and grow with the addition of the next generation of CLL researchers: Drs. Versha Banerji, clinician scientist, Sachin Katyal, senior scientist at CCMR, and Lin Yang, Clinic Lead and hematologist.

## *Dr. James Johnston*



Dr. James Johnston is a clinician scientist at CancerCare Manitoba, a national leader in chronic lymphocytic leukemia (CLL) research, and widely considered one of Canada's thought leaders in CLL.

Dr. Johnston with Dr. Spencer Gibson formed the first Manitoba multidisciplinary CLL research program, carrying out both laboratory and clinical research in this disease. This program was facilitated by the formation at CancerCare Manitoba of the first designated CLL Clinic in Canada. To stimulate CLL research across Canada, they established the Canadian CLL Research meeting which is held annually in Winnipeg, and brings together researchers from across Canada and the USA.

Dr. Johnston continues to provide insight into treatment issues for Canadian CLL patients.

*"Dr. James Johnston is one of our senior clinician scientists who has been a mentor for oncologists and scientists over the years. He has facilitated the successful career path for many researchers. Dr. Johnston played a key role in my decision to specialize in oncology and continues to be a mentor". - Dr. Sri Navaratnam*



**The Chronic Lymphocytic Leukemia research team was the first multidisciplinary team at CancerCare Manitoba and in Canada.  
Current team members (L to R): Dr. S. Katyal, Dr. V. Banerji, Dr. J.B. Johnston, Dr. L. Yang.**



**Manitoba Tumour Bank Team**





# Working Together to Improve the Lives of Women Living with Ovarian Cancer

Like most cancers, ovarian cancer is not a single disease. Epithelial ovarian cancers (EOCs) are comprised of multiple subtypes, each having a different cellular origin and response to therapy. High-grade serous ovarian cancer (HGSOC) is the most common and aggressive subtype of EOC. HGSOC is the leading cause of cancer-related deaths of all gynecological cancers in the developed world. Many women with this type of cancer initially respond to chemotherapy, yet most HGSOC patients will develop recurrent disease that ultimately becomes resistant to available treatments.

Screening tests for any type of EOC are not presently available. Because symptoms of the disease are subtle in most patients, patients often present for the first time with an advanced form of the disease, which comes with a poor prognosis. Because of the disease's unsatisfactory treatment outcome, more research is still required. As such, Dr. Mark Nachtigal, Dr. Kirk McManus (Senior Scientists at the Research Institute) along with Dr. Alon Altman (gynecologic oncologist) started the Manitoba Ovarian Cancer Research (MOCR) group partly to facilitate the development of new models of HGSOC formation to identify new targets for drug development and treatment. The group, working in tandem with the Manitoba Tumour Bank, uses EOC tissues generously donated by Manitobans suffering from the disease.



Members of the Manitoba Ovarian Cancer Research (MOCR) group

Recently, the MOCR team expanded to include Dr. Jody Haigh, Dr. Britt Drögmöller, Dr. Janylyn Arsenio, and Dr. Kathleen Decker to gain new insights into the onset and growth of HGSOC. In particular, they are now developing new models that will be used to understand how HGSOC forms from normal cells and examine how HGSOC cells change over time and in response to drug treatment.

“We have been able to build a strong multi-disciplinary ovarian cancer research team in Manitoba. Everyone has the same goal of improving patient outcomes,” says Dr. Mark Nachtigal, Senior Scientist at the CCMB Research Institute.

Collectively, the multi-disciplinary efforts and approaches employed by the teams are aimed at improving the lives of Manitoban women living with ovarian cancer.

# Creating Innovative Treatments for the Deadliest Form of Brain Cancer

Glioblastoma multiforme (GBM), is the most aggressive form of brain cancer, having an average survival time of 12 to 18 months. Because of the challenges in treating GBM together with very poor survival outcomes, a lot of research continues to be done in this field.

Currently, the first treatment patients receive is surgery, followed by chemotherapy and radiation. The outcome can be improved by enhancing radiation treatment and overcoming resistance to chemotherapy. The multidisciplinary research team at CCMR is approaching these areas by looking at how to improve radiation treatment and how to fight drug resistance.

Diagnostic Magnetic Resonance Imaging (MRI), a non-invasive medical imaging technology used to assess a tumour's response to treatment is done as a follow-up to see how the tumour is responding to treatment, and whether there is progression or recurrence. About fifty percent of the time the MRI shows the tumour has increased in size in the first 6 months. For some patients, this progression is a reaction to treatment and not a growth in the tumour. This is called pseudoprogression.

"The challenge is you can't tell the difference between whether the cancer is progressing or if it is pseudoprogression," says Dr. Marshall Pitz. "It is important to determine which is which. With our current MRI techniques, we can't tell." It is essential to differentiate between the two since treatments for each are vastly different from one another.

Dr. Pitz, a clinician scientist and medical oncologist who treats patients with brain cancer at CCMB, leads a multidisciplinary team with fellow researchers: Dr. Boyd McCurdy and Dr. Lawrence Ryner, Medical Physicists at CCMB, Dr. Marco Essig, Director of Diagnostic Imaging at Shared Health and Adjunct Scientist CCMR, as well as Dr. Ahmed Ashraf, Data Scientist in Computer Engineering at the University of Manitoba. The team is studying the use of new advanced MRI sequences to gain additional information about the tumour. This includes identifying pseudoprogression and predicting the location and timing of progression in this disease using artificial intelligence (AI). The team is exploring the ability to modify radiation treatment plans based on the prediction information to see if this will improve the treatment and delay disease



Dr. Boyd McCurdy



Dr. Lawrence Ryner



Dr. Marco Essig



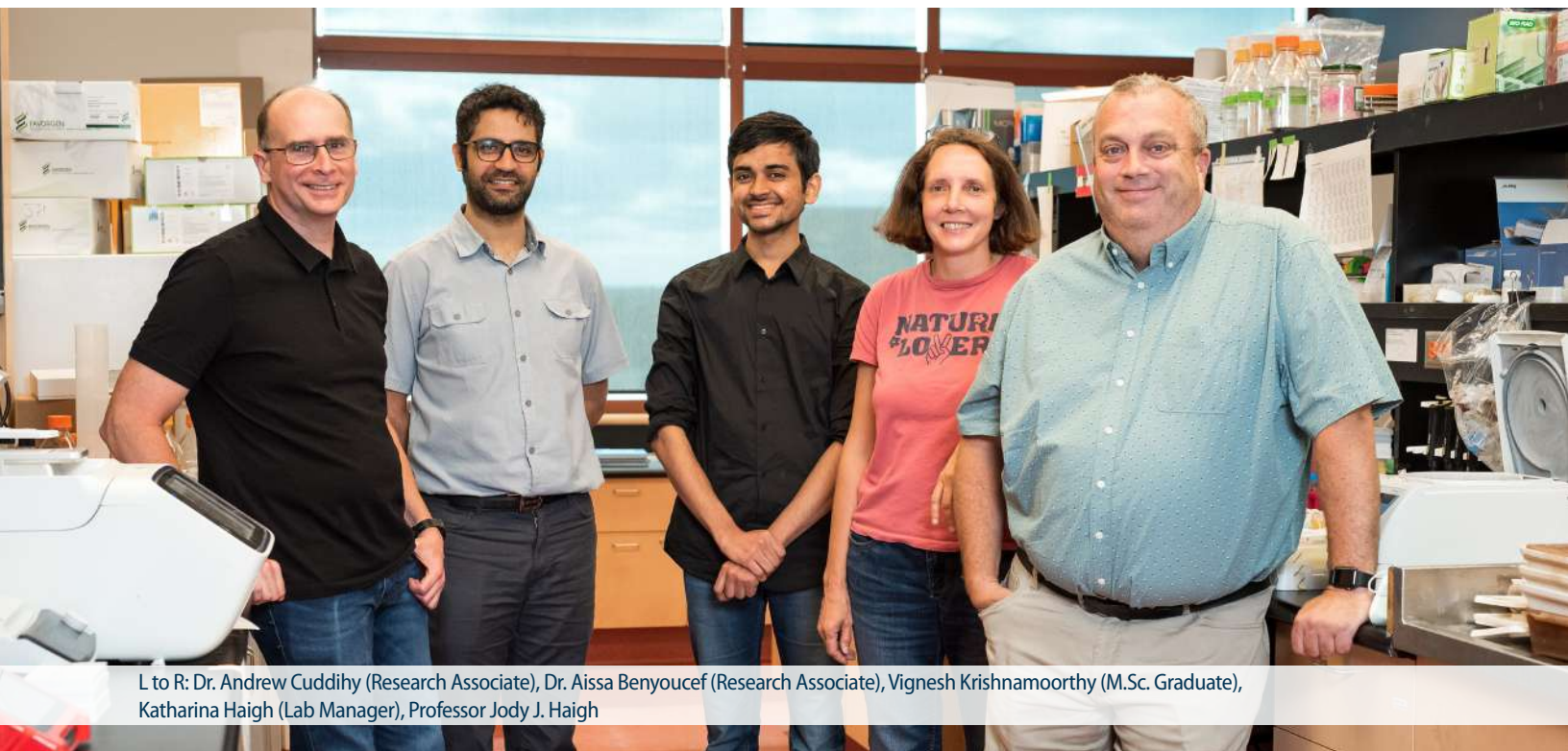
Dr. Marshall Pitz

recurrence while minimizing treatment to parts of the brain at lower risk.

Dr. Sachin Katyal, a Senior Scientist and brain tumour researcher, is looking at the resistance of the tumour to chemotherapy. Drug resistance is pervasive in GBM disease, resulting in tumour recurrence and leaving GBM patients with few follow-up options. Dr. Katyal is looking at identifying ways tumour cells evade chemotherapeutic drug action and harnessing this knowledge to find ways to resensitize GBM to these drugs. Every cell in our body has an inborn capacity to repair DNA damage caused by the environment, the foods we eat and the drugs we may consume so that our cells survive, thrive, and regenerate. Most chemotherapies are intended to hone in and cause significant DNA damage to tumour cells and overwhelm this DNA repair mechanism; however, tumour cells can develop an ability to ramp up this repair activity and become chemo-resistant. Dr. Katyal has identified a specific part of the tumour cell's DNA repair mechanism that is overactive, and he and his research team and collaborators have identified a new drug that may quell this hyperactive repair activity to allow for chemotherapies to regain their tumour-killing ability.



# A Potential New Way of Treating an Aggressive Form of T-Cell Leukemia



L to R: Dr. Andrew Cuddihy (Research Associate), Dr. Aissa Benyoucef (Research Associate), Vignesh Krishnamoorthy (M.Sc. Graduate), Katharina Haigh (Lab Manager), Professor Jody J. Haigh

Dr. Jody Haigh, Senior Scientist at CCMR, and his research team have identified a novel combination therapy that holds great promise for treating an aggressive form of T-cell leukemia named ETP-ALL (Early T-cell Precursor Acute Lymphoblastic Leukemia), which is typically quite aggressive, difficult to cure, and often relapses.

This novel combination therapy shifts the balance of survival factors toward cell death-inducing factors in cells otherwise resistant to epigenetic inhibitor therapies. The research demonstrates how previous resistance to therapy treatments occurs and how a more effective combination of therapies may improve the outcome for patients with this aggressive form of leukemia.

The discovery follows the research team's previous research that discovered the specific pathways and factors that contribute to ETP-ALL being difficult to treat.

This preclinical breakthrough has the significant potential to influence future clinical trials. All the drugs used in this study are Health Canada and FDA-approved and are presently in various clinical trials as monotherapies for other forms of leukemia.

# Research and Innovation by the Radiation Oncology Team



Dr. Rashmi Koul, Dr. Julian Kim, Dr. Boyd McCurdy

The Radiation Oncology Program at CancerCare Manitoba consists of three disciplines: Radiation Oncology, Medical Physics and Radiation Therapy. This team has been at the forefront of advancing radiation treatment through research and innovation.

CancerCare Manitoba was the first in Canada to implement single-fraction SBRT (stereotactic body radiation treatment) for lung cancer. The pandemic required that CCMB reduce the exposure of cancer patients to COVID-19. As such, the Radiation Oncology team designed and studied a research program that decreased the number of patient visits for radiation treatments without compromising patient care and outcomes. Results from this innovative approach demonstrated the schedule was safe and effective for carefully selected patients with robust treatment planning. This method has since become a standard method of treating select patients at CCMB. Results have been presented at national and international conferences with many other cancer centres now following suit.

CancerCare Manitoba is the only cancer centre providing Calypso-based SBRT for lung cancer to improve the precision of radiation treatment delivery. The Radiation Oncology Team conducted an investigator-initiated clinical trial to establish the safety and benefit of this approach. The Calypso is a small implantable radio-beacon inserted in the lung close to the tumour and tracked in real-time to monitor the position of a tumour in the lung while radiation treatment is being delivered. Based on the results of the study, the use of the Calypso system in the delivery of radiotherapy has been adapted as standard care in select patients.

# Investigator-initiated Clinical Trials by the Hematology Research Team

## *Making a global impact*

The CCMB Chiron Hematology research team, led by Dr. Zarychanski, hematologist and Senior Scientist at CCMR, is comprised of physician investigators and over 20 team members who collectively evaluate strategies to improve the lives of patients with cancer and blood disorders. They are one of the most productive research teams in the province and their novel methods and research findings have helped establish best practices in Manitoba and around the world. In addition to conducting high-impact research, the team is committed to training the next generation of clinical scientists who will investigate therapies to improve outcomes for patients with cancer and blood disorders.

Investigator-initiated clinical trials in hematology have reached what promises to be an exciting next phase in its history at CancerCare Manitoba. The group leads national and international clinical trials evaluating therapies to improve outcomes for patients with cancer and life-threatening blood disorders.

A large international trial, ATTACC-CAP, is repurposing a blood thinning agent (heparin) in patients with lung infection (pneumonia). The team developed and led a global trial that showed treatment with heparin improved survival and prevented severe infection when given to hospitalized patients with COVID-19. Knowing that pneumonia is the most common cause of infection in patients with cancer, the team received federal funding to investigate whether heparin will improve survival and prevent critical illness in this vulnerable patient population. The trial will begin in April 2023 and will enroll patients in Manitoba and around the world.

A trial called TRACTION is evaluating the ability of an inexpensive drug (tranexamic acid) to reduce bleeding and the need for blood transfusion in approximately 8000 patients undergoing major surgery in Manitoba and Ontario. When completed, TRACTION will be the largest Canadian-led clinical trial involving oncology patients ever conducted.



Dr. Emily Rimmer, Dr. Ryan Zarychanski, Dr. Brett Houston

A pan-Canadian, Manitoba-led trial called PLEXSIS, is studying plasmapheresis in patients with severe infection. Plasmapheresis is a specialized hematology procedure performed by CancerCare doctors where a patient's abnormal plasma is exchanged with healthy donor plasma. The PLEXSIS trial aims to provide effective therapy to help patients recover from a life-threatening infection.

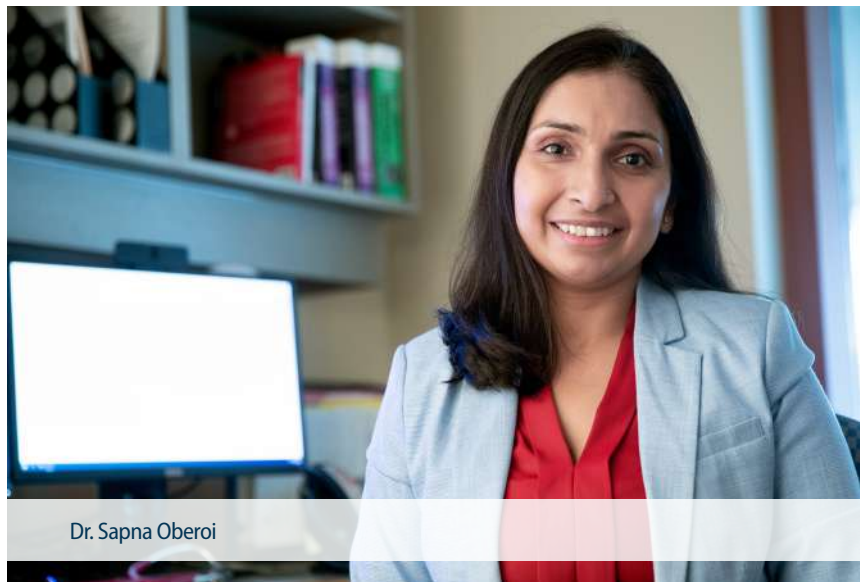
Another Manitoba-led multi-centre Canadian trial, MYELO-CAN, is evaluating therapies in patients with blood cancers such as myelodysplastic syndrome and acute leukemia. Using novel research methods the trial will initially study therapies to reduce bleeding and infection among patients with blood cancers undergoing chemotherapy then will expand to additional therapies to improve patient-prioritized outcomes and quality of life.



# Pediatric Research at CancerCare Manitoba Research Institute

Dr. Sapna Oberoi is a pediatric hematologist/oncologist at CCMB and Scientist at CCMR. Her research program focuses on enhancing symptom management, especially mental health and supportive care of children, adolescents, and young adults (AYAs) with cancer to improve their overall outcomes, cancer experience, and quality of life during and after their cancer treatment. Her research involves engaging and partnering with patients, using quantitative and qualitative approaches, and routinely collecting population-based administrative data. Addressing disparities in cancer care of children and AYAs with cancer is an essential goal of this research.

Another important aspect of Dr. Oberoi's research is to improve the outcomes of children and AYAs with sarcomas. She is a young investigator with the soft tissue sarcoma committee of the Children's Oncology Group (COG), currently working on several projects to improve the treatment and outcome of children and adolescents with soft-tissue sarcomas.



Dr. Sapna Oberoi



Pediatric Hematology/Oncology Team Members  
Lower (L to R) - Dr. Jayson Stoffman, Dr. Cielle Stapleton, Dr. Geoff Cuvelier  
Upper (L to R) - Dr. Ashley Chopek, Dr. Magimairajan Vanan, Dr. Sara Israels

# Health Services Research

## *Advancing Cancer Services for Manitoba*

Health services research is the study of the structure, processes, and impact of health services on the population. This research provides key information to help improve healthcare practices, policy, and outcomes, and contributes to a learning healthcare system.

The aim of health services research at CCMR is to identify and support the most effective ways to organize, manage, and deliver high-quality (equitable, appropriate, accessible, safe, efficient, and effective) cancer services for Manitobans. Cancer health services research is led by Dr. Kathleen Decker with strong ties to and support from the Department of Epidemiology, the Manitoba Cancer Registry, the Health Informatics Platform, CancerCare Manitoba clinician scientists, and collaborators from across Canada. Research projects also include patient advisors and healthcare decision-makers to help ensure that research questions are relevant and results are quickly communicated to those who need the information and early-career investigators, fellows, and graduate students to train the next generation of cancer health services scientists.

Health services research at CCMR has three primary areas of focus. First is outcomes research. Outcomes research measures the impact of health services, interventions, and natural experiments on cancer services and cancer outcomes. Current areas of work include examining the impact of COVID-19 on cancer control (from screening to survival) and measuring the quality of surgical care provided in Manitoba.

The second is health equity research. Health equity research studies the factors that contribute to health inequities in cancer care so we can reduce health disparities. The team is examining how improved access to data for cancer navigators impacts a patient's healthcare use, patient-reported outcomes, process measures, and



costs. The team is also looking at who visits the Urgent Cancer Care Clinic to better understand barriers to care. Because a core component of the research program is to examine equity in cancer services, we include a measure of inequity (such as sex-based analyses) in all research.

Third is data science research. Data science research examines how we can use machine learning tools to improve research processes and identify outcomes that are currently not easily available. The research team is developing and testing tools that will identify patients who experience cancer recurrence and progression to either replace the need for a retrospective chart review or reduce the number of charts that need to be reviewed. Our goal is to make the research process more efficient and less costly for all clinicians and researchers.





L to R: Pascal Lambert, Dr. Kathleen Decker, Allison Feely, Oliver Bucher, Dr. Maclean Thiessen



# CAR-T Therapy Bringing Research to the Patient



Members of the Cellular Therapy Laboratory from L to R: Angeline Giftakis MLT, Dr. Chantalle Menard, Qingdong Guan PhD, Marie Tulloch MLT, and Dr. David Szwajcer, Medical Director.

CAR-T cell therapy is proving to be a very effective way of treating certain blood cancers. It reprograms a patient's immune cells to target and attack cancer cells throughout the body. This is a new treatment for some types of leukemia and lymphoma (blood cancers).

T-cells, a specific type of white blood cell, are drawn from the donor and modified in a lab so they will specifically target and attack cancer cells. The changed cells, called chimeric antigen receptor (CAR) T-cells, are grown in large numbers and then infused back into the patient.

The Research Team led by Dr. David Szwajcer at CCMB is actively involved in several CAR-T therapy-related research projects.

As with other Canadian cancer centres, the team is exploring the opportunity to produce CAR-T products in Manitoba. CCMB is well-positioned to produce this product because of a well-established cellular therapy laboratory,

highly qualified professionals and infrastructure. Local manufacturing and administration of CAR-T products may significantly reduce the cost of therapy and decrease the cost to Manitobans.

CCMB, in partnership with BioCanRx, received a \$1M research grant through the National Research Council to locally manufacture and administer Canadian-developed CAR-T products.

Working with the BioCanRx, CAR-T cell biomanufacturing network, the research team is validating in-laboratory CAR-T manufacturing under Good Manufacturing Practice (GMP) in Manitoba. The BioCanRx point-of-care network development work in Manitoba is funded by BioCanRx, CancerCare Manitoba Foundation and the National Research Council. The primary purpose of developing in-province CAR-T manufacturing capacity is to participate in several planned Canadian early-phase CAR-T clinical trials.

## Opportunity for Training in Manitoba

In partnership with the Red River Polytechnic's Laboratory Technical School leadership, an eight-month internship program is being developed, funded by MITACS and housed at the Cellular Therapy Laboratory (CTL). This will allow recent program graduates to develop skills in Cellular Therapy GMP production. The initial intake of students is planned for summer 2023.

## Building a Better Manufacturing Network

Dr. QD Guan and Dr. David Szwajcer are participating in the ExCELLirate Canada Canadian Clinical Trials Group initiative. ExCELLirate Canada is a new nationally-coordinated research platform for next-generation cancer immunotherapy. As part of this initiative, Dr. Szwajcer is working closely with the

Group's Economics Committee to undertake a Supply Chain Analysis to better understand how to optimize manufacturing capacity in Canada.

The Manitoba Blood and Marrow Transplant Program and the Lymphoma Disease Site Group membership in partnership with CCMB's CTL have diligently worked on laying the foundation for a comprehensive CAR-T program over the past five years that will meet the needs of Manitobans now and into the future. The goal of the research program is to explore the production and delivery of novel cost-effective cellular immunotherapies closer to home. In addition to research, this will also bring business and training opportunities to Manitoba.

## Cancer research drives new treatment options



Shirley Mooney was first diagnosed with large B-cell lymphoma in 2008. She responded well to chemotherapy and, after six sessions, went into remission. Eleven years later, however, the cancer returned. Adding to the difficulty of her situation, Shirley experienced life-threatening complications during chemotherapy. This required a change of treatment to a stem cell transplant, which was effective. Though she was in remission, doctors noted that her complications would limit treatment options if the cancer returned a third time.

Shirley's cancer did return in 2022. Fortunately, a new treatment called CAR-T therapy recently completed clinical trials and was now available for Shirley. She had to travel out-of-province to Toronto, Ontario for the treatment, requiring her to be away from home and family for extended periods. Shirley responded well to this new innovative treatment and soon went back into remission. She's currently living happily in Arizona with her husband, Wayne, and recent PET scans show no signs of active cancer. In January 2023, CancerCare Manitoba announced provincial funding for CAR-T therapy in Manitoba. Patients will soon be able to receive their treatment in Winnipeg. CancerCare Manitoba researchers are also working to develop novel CAR-T therapies for different types of cancers.

April 2022 - Departing the Winnipeg Airport for Toronto to receive altered T-cells.

**Cancer research helps make leading-edge treatments available to Manitobans.**

# Dignity Therapy

## Enhancing the Family and Patient Experience

Dignity Therapy is the most studied psychosocial intervention in palliative care and has seen an uptake in healthcare facilities providing care to patients with advanced cancer worldwide.

Dr. Harvey Max Chochinov is a Distinguished Professor of Psychiatry at the University of Manitoba and a Senior Scientist at the CancerCare Manitoba Research Institute. He began his career at the former Manitoba Cancer Treatment and Research Foundation in 1987 after returning from completing a Fellowship at Memorial Sloan Kettering Cancer Center.

Dr. Chochinov and Mr. John Farber helped establish what would evolve into the current Department of Patient and Family Support Services at CCMB.

In 1992 he received his first research grant from CancerCare Manitoba Foundation, launching a program of research in psychosocial oncology and palliative care that has been praised for its innovation and impact around the world.

His work on dignity in the context of life-threatening and life-limiting illness has been ground-breaking and includes the development of outcome measures tracking dignity-related distress; frameworks for ensuring the provision of dignity-conserving care; and a novel individualized psychotherapy coined Dignity Therapy.

A cancer diagnosis can be emotionally disorienting, affecting almost every aspect of a person's life. Suddenly, one no longer feels like the person they once were, given cancer's ability to touch people in deep and personal ways. This is where Dr. Chochinov's research shined a light on identifying the various things that can influence a patient's cancer journey.



Dr. Harvey Chochinov with PhD Candidate Salina Pirzada, M. Sc.

He has shown the profound influence that healthcare provider attitude can have in shaping patient experience, and how patients look towards healthcare providers as a means of affirming their self-worth.

Whether they realize it or not, healthcare providers are often the 'mirror' into which patients and families gaze to gauge their perceived status and worth.

In 2022, because of the COVID-19 pandemic, Dr. Chochinov hosted a three-part, virtual international symposium on Dignity in Care that included about 25 healthcare staff from CCMB. This workshop provided training in how healthcare providers could use empirically validated approaches to affirm personhood, thereby enhancing job satisfaction, and mitigating burnout while enhancing patient and family experience and healthcare outcomes.



# COVID Research at CancerCare Manitoba Research Institute

## *Adjusting the Sails at a Time of Urgent Need*

### **COVID Clinical Trials by the Hematology Team**

As the world was struggling with the first wave of COVID-19, physicians were desperate to identify treatments that could help patients and protect themselves. Beneficial effects of some drugs were politicized and purveyed as effective without clinical data. Local treatment decisions were inconsistent and uninformed.

Although stretched thin by ongoing clinical trials and expanding clinical needs, it didn't take much effort for Dr. Ryan Zarychanski, Senior Scientist at CCMR and a hematologist at CCMB, and his team to be convinced to drop everything, and organize the clinical trial response to COVID-19 for Manitoba. To get answers as quickly as possible, they collaborated widely with colleagues from around the world.

Within a matter of months, the team had disproven the effectiveness of hydroxychloroquine. After the team published their findings, hydroxychloroquine was regarded as ineffective by the medical community. Next, the international team discovered that steroids, when given to hospitalized patients who require oxygen, reduced respiratory failure and improved survival. In the months that followed, the Manitoba team enrolled hundreds of patients in COVID-19 clinical trials, that identified several effective therapies.

With the experience studying heparin in patients with infection, and with the information that COVID-19 was associated with blood clots and inflammation, Dr. Zarychanski designed a randomized trial to test whether heparin improves outcomes in patients hospitalized with COVID-19. Eight months after receiving funding the now global trial team enrolled over 3000 patients from 121 hospitals in 10 countries.

The findings were significant wins for patients and health systems that were running short of intensive care beds. Findings were published in the New England Journal of Medicine and set the expectation for the clinical care of COVID-19 disease around the world. In the months that followed, the results of the trials were adopted by the World Health Organization and incorporated into international guidelines.

COVID-19 paved the way for changes in the way doctors work and patients interact with the health system and highlighted the importance of clinical trials as a hallmark of excellent clinical care.

### **Improving screening for COVID by Tracking Viral Variants**

At the start of the pandemic, Dr. Jody Haigh, Senior Scientist at CCMR, and his research team purchased a server capable of developing novel computational tools using large amounts of sequencing data for tracking SARS-CoV-2 variants (COVID).

The initial analysis identified unique mutations to the virus based on the geography (US, Australia, China) of the infection during the first wave of the pandemic. Variants with the potential to cause false negatives during diagnostic testing were also identified.

Subsequently, the team streamlined the process to download and store large amounts of sequencing data sets on the server. Using these data sets, they developed a separate analysis pipeline which led to the discovery of SARS-CoV-2 hypermutation that did not rapidly spread (less than in 2% of genomes), likely arising due to host immune response and not due to sequencing errors.

They also discovered a part of the virus genome/genetic material that actively changed during the pandemic which may partly explain why the virus was able to evade the immune system.

Dr. Josef Penninger, a world-leading expert on SARS research at the University of British Columbia, contacted Dr. Haigh in April 2020 about creating a humanized mouse model for the COVID-19 study. Dr. Haigh and his team developed this model in less than 6 months. It has since been transferred to the Penninger lab for additional research on the role of hACE2 in SARS-CoV-2 infections and pathology. It will also be very helpful for future viral variant testing and drug validation investigations.

## Evaluating the Impact of the Pandemic on New Cancer Diagnoses and Oncology Care in Manitoba

The COVID-19 pandemic had an unprecedented impact on cancer care. In Manitoba, several interventions were implemented by CancerCare Manitoba to keep patients safe while continuing to provide high-quality care. These interventions included changes to organized cancer screening programs, shifts from in-person to virtual care, the prioritization of critical cancer surgeries, and alterations to chemotherapy and radiotherapy treatment schedules. To better understand how these COVID-19-related changes affected the cancer care system and individuals with cancer, it was decided to measure the impact of these changes using real-world, population-based cancer and health care data. The goal is to provide results to health care providers, patients, and decision-makers to ensure that Manitobans with cancer receive the highest standard of care during and after the pandemic and improve the cancer control system's resilience and ability to learn and change to meet new challenges.

To date, the impact of COVID-19 on cancer screening, the number of new cases of cancer and cancer incidence, cancer treatment, and virtual care have been examined. This research is being led by Dr. Kathleen Decker, Senior Scientist at CCMR, and includes a multidisciplinary team of oncologists, surgeons, epidemiologists, biostatisticians, and programmers.

The research concluded the COVID-19 pandemic resulted in decreases in breast, cervical, and colorectal cancer screening immediately after the implementation of COVID-19 restrictions. Within a few months, all screening programs adapted to the COVID-19 pandemic and one year later, the number of screening mammograms, Pap tests, and program FOBTs reached pre-pandemic levels. The deficit in the number of screening tests has also decreased over time.

It was also found that the COVID-19 pandemic resulted in a substantial decrease in new cancer diagnoses, pathology reports, and cancer surgical resections immediately after the implementation of COVID-19 restrictions. Importantly, intravenous chemotherapy visits, first radiotherapy visits, and the number of all types of visits to CancerCare Manitoba did not change. Surgery was initially impacted to a greater degree than other forms of cancer treatment because surgical resources, including staff, ventilators, PPE, and hospital rooms for patient recovery, were redirected to address COVID-19 needs. Additionally, some patients may have elected to postpone their surgery and/or begin neo-adjuvant systemic therapy. However, the results suggest a gradual recovery in

cancer surgery because there was no longer a statistically significant difference in the number of cancer surgeries by July 2020. The number of radiotherapy fractions, Urgent Cancer Care Clinic visits, and in-person visits also decreased. The decrease observed in the number of radiotherapy fractions correlates with CancerCare Manitoba's wider implementation of hypo-fractionated RT for breast, prostate, lung, brain, and palliative patients immediately at the start of COVID-19 restriction in line with the most recent radiotherapy treatment guidelines and recommendations. The decrease in Urgent Cancer Care Clinic visits and in-person visits aligns with the greater use of virtual care.

It was also found that the COVID-19 pandemic resulted in a decrease in the age-standardized incidence rate for all cancers in May and April 2020 during the first pandemic wave and a decrease after the second wave in November 2020. The initial drop was primarily due to decreases in breast and colorectal cancer incidence. The subsequent drop was mostly due to a decrease in lung cancer incidence. Breast cancer among women  $\geq 75$  years of age, as well as urinary and brain and CNS cancers, showed sustained decreases in incidence. All other cancer sites demonstrated minimal long-term changes in incidence.

While the number of all visits to CCMB did not change, the number of in-person visits decreased by one-half and was replaced by telephone/video visits. Virtual visits have advantages including increased patient convenience and accessibility and lower transportation costs but also potential limitations such as technical issues, inability to complete a full physical examination, and privacy considerations. To further understand the impact of virtual care on patients' satisfaction and quality of care, 33 patients and 6 informal caregivers were interviewed. It was found that virtual care, when implemented in a way that provides an optimal fit between what patients need and health services (i.e., when non-verbal communication and physical examination are not important), can improve the experience of living with cancer.

The next steps in this research include examining the impact of COVID-19 on cancer screening, incidence, and care by regional health authority and sex. The impact of the pandemic on diagnostic tests for cancer, stage of cancer diagnosis, the travel and time saved to patients because of virtual care, and overall survival are being looked at.





Dr. Rashmi Koul, Department Head, and members of the Radiation Oncology Program and Rapid Access Clinic

## **Radiation Oncology - Maximizing Benefits, Minimizing Patient Risk**

At the onset of the COVID-19 pandemic, the radiation oncology program team quickly looked at innovative ways to offer state-of-the-art radiation treatment to Manitobans.

The team effort resulted in new highly effective enhanced radiation techniques such as single fraction lung stereotactic body radiotherapy (SBRT), hypofractionated breast cancer radiation and prostate bed hypofractionated radiation.

These protocols were tested by a robust quality assurance process led by the Medical Physics team. These new techniques yielded excellent oncological results with fewer treatment fractions, effectively reducing the number of visits patients were required to make to CCMB for radiation treatments and an overall reduction in patient traffic through CCMB facilities.

To date, these efforts have yielded good cancer control treatments that are world-class and extremely safe. Several of these efforts in innovative modifications to radiation treatments have been published.

## *Clinical Trials as a hallmark of excellent clinical care*

Dr. Brett Houston is a hematologist and clinician investigator at CCMR. She recently completed her PhD in clinical epidemiology and clinical trials. Her PhD evaluated innovative trial designs to optimize efficiency and increase trial participation and access. Her thesis ultimately culminated in the TRACTION trial, a large multicentre clinical trial evaluating the use of tranexamic acid (a medication to reduce bleeding) to reduce blood transfusion in a large surgical population. She is now one of the principal investigators of this trial, which is anticipated to enroll >8,000 patients by the end of 2023.

Dr. Houston has a clinical and research focus in blood cancers, such as myelodysplastic syndrome and acute leukemia. She is committed to the integration of research into routine clinical practice, and is working to incorporate tumour banking, national registry participation, and trials access into the clinics. She is now applying her trials training and experience to further trial opportunities for patients affected with these blood cancers.

Dr. Houston is leading MYELO-CAN, a national initiative to establish durable clinical trial infrastructure across the country, with the ultimate goal of increasing accessibility and efficiency of clinical trials in this high risk but vulnerable population.

In 2022 Brett Houston was recognized as one of CBC Manitoba's Future 40 under 40. Congratulations!

## *International collaborative research may lead to the prevention of some (deadly) childhood brain tumours*

Dr. Tamra Ogilvie is a Scientist at CCMR and CHRIM (Children's Hospital Research Institute of Manitoba) and a Professor in the Department of Biochemistry and Medical Genetics at the University of Manitoba. Her research is completely dedicated to the study of the pediatric brain tumour, medulloblastoma, the most common malignant primary brain tumour in children.

Brain tumours are the deadliest form of childhood cancer and account for 20 percent of all new pediatric cancer cases. The current treatment is very aggressive and includes surgery, high doses of chemotherapy, and/or radiation therapy of the brain. Survivors can deal with the long-term effects of chemotherapy and radiation.

Dr. Werbowetski-Ogilvie led a Manitoba team that was part of an international research team that uncovered the first indication that a type of medulloblastoma may be preventable by identifying how and where these tumours develop during human fetal brain development.

They discovered that a pre-malignant form of the tumour originates much earlier in pregnancy than originally believed. This groundbreaking research provides the opportunity between birth and symptom onset to detect and possibly prevent cancer.



## *Mechanisms of platelet function as a research focus*

Dr. Sara Israels is a Scientist at CCMR and Professor in the Department of Pediatrics and Child Health and Vice Dean (Academic Affairs) in the Rady Faculty of Health Sciences, University of Manitoba.

Under Dr. Israels leadership the platelet research laboratory studies basic mechanisms of platelet function and investigates patients with inherited platelet function abnormalities, in collaboration with the clinical Haemostasis Laboratory at the Health Sciences Centre. Their projects include:

- Studies of patients with inherited platelet disorders, with a particular interest in platelet ultrastructure.
- Studies of signal transduction pathways and signal transduction defects in platelets.
- Studies of platelet function in newborn infants that have demonstrated differences in how these neonatal platelets respond to stimuli, and how this contributes to bleeding and thrombosis risk in the perinatal period.
- Development of a national registry of patients with inherited platelet disorders, an opportunity to improve our understanding of these rare conditions, and aid in their diagnosis, and evaluate treatment options.

## *Translating key findings from bench to bedside while training our next generation of scientists*

Dr. Sabine Mai is a Senior Scientist at CCMR, Professor in the Department of Physiology and Pathophysiology, University of Manitoba, and Tier 1 Canada Research Chair in Genomic Instability and Nuclear Architecture in Cancer.

Dr. Mai established the Genomic Centre for Cancer Research and Diagnosis (GCCRD), a multi-disciplinary basic and translational/clinical research facility at CancerCare Manitoba using cutting-edge molecular imaging approaches. Her team has used super-resolution imaging to examine the nuclear architecture of the genome of cancer cells. With novel software the team developed, they were able to quantify the super-resolved genomic differences in nuclear architecture between normal and tumour cells.

Using quantitative 3D nuclear telomere imaging, her team has been able to develop the 3D telomere organization as a structural biomarker for multiple cancers, including prostate cancer, multiple myeloma, myelodysplastic syndromes, and acute myeloid leukemia, glioblastoma, and neuroblastoma. To translate her findings from the bench to the clinic, Dr. Mai co-founded Telo Genomics Corp, located at MaRS, the Canadian Discovery District, in Toronto.

Dr. Mai has directly supervised and mentored more than 1,500 trainees, including undergraduate and graduate trainees, postdoctoral fellows and professors from Canada and all over the world.





## *Improving cancer diagnostic treatments and techniques*

Dr. Stephen Pistorius is a Senior Scientist at CCMR and Associate Head/Professor, Department of Physics and Astronomy, University of Manitoba. His research looks at improving, optimizing, and quantifying various diagnostic and therapeutic techniques and understanding the radiation transport of clinically useful imaging and treatment modalities.

Dr. Pistorius trains and supervises numerous graduate and undergraduate students carrying out research in cancer imaging, specifically, in developing improved systems for cancer diagnosis which use scatter enhanced x- and g-ray techniques and microwaves; as well as on-line megavoltage portal imaging, aimed at real-time in-vivo tracking of motion and optimization of complex radiotherapy treatments and in the use of artificial intelligence to help analyze images and to detect and classify tumours.

Dr. Pistorius is author of over 200 publications and presentations, and he has received over \$4.5M in grant funding in the last 5 years. He and his students have received numerous national and international awards for their research.

## *Stopping breast cancer cells from growing*

Dr. Afshin Raouf is a Scientist at CCMR and Associate Professor, Department of Immunology, Max Rady College of Medicine, University of Manitoba.

Dr. Raouf's research interests lie in better understanding the cells that generate and sustain breast cancer tumours. It is becoming clear that progress in treating breast cancer effectively requires a better understanding of these cancer stem cells and how they are abnormal.

Growing evidence suggests that breast cancer tumours are maintained by a rare subset of cells that have stem cell properties, indicating that new therapies are needed to eliminate them to achieve more effective treatments with a decreased chance of tumour recurrence. This reinforces the hypothesis that normal stem and progenitor cells are important cellular targets in the initiation and recurrence of human breast cancer.

The mutations arising in stem cells could represent an efficient process for hijacking the regulated production and differentiation of primitive normal mammary cells.



## *Researching and advocating for the best care and treatment of older adults with cancer*

Dr. David Dawe is a Medical Oncologist and Affiliate Scientist with CCMR, and Assistant Professor, Department of Internal Medicine, University of Manitoba.

Dr. Dawe's research interests lie in the use of clinical and administrative databases to examine outcomes, quality, and disparities in care. His primary focus is disparities experienced related to age and frailty to identify opportunities for improvement at CCMB and in the broader health system.

Many common cancers are diagnosed more often in older people. This population has complex challenges that are less common in younger patients, such as pre-existing health conditions and many prescription medications. Frailty, defined as an high vulnerability to poor health outcomes, is more common as we age, more common in people with cancer, and linked to poor cancer outcomes.

"With any treatment, we want to have a better chance of helping than hurting. An important part is their body's ability to take the stressor of chemotherapy or radiation or surgery and then recover from it. For each of us, our body has a point at which it just can't recover. There are situations in which treating the cancer would actually cause more harm than good."

Dr. Dawe is also undertaking research into blood-based biomarkers of frailty in people with cancer. This work aims to improve understanding of the biology of frailty in people with cancer and identify tests that may help identify people at higher risk of poor outcomes with cancer treatment. These tests could then be implemented at CCMB in the future.

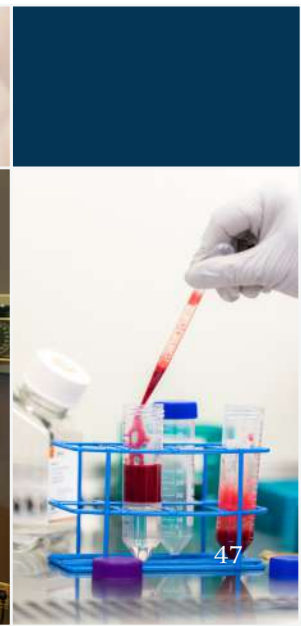
## *Increasing our national and international presence*

Dr. Kristjan Paulson is a Hematologist at CCMB and Assistant Professor of Internal Medicine at the Max Rady College of Medicine, University of Manitoba.

He has additional training in the fields of acute leukemia and blood and marrow transplantation. He provides clinical services within the Leukemia and Blood and Marrow Transplant Disease Site Groups.

He is the primary investigator and scientific director for the Canadian Blood and Marrow Transplant Group Registry, a clinical outcomes database of over 20,000 Canadians who have undergone stem cell transplantation. He is also the leader of the Canadian Acute Promyelocytic Leukemia registry, capturing outcomes data on patients with a rare type of leukemia to help guide future therapies. He has led national and international clinical trials in the field of stem cell transplant, and is the current primary investigator of an international investigator initiated randomized clinical trial looking at a new medication to reduce the risk of chronic graft versus host disease following transplant.

He is leading the development of a Canadian acute leukemia registry and serves on the board of the Canadian Acute Leukemia Study Group and is the Past-President of Cell Therapy Transplant Canada.



## Prevention and screening for colorectal cancer

Dr. Harminder Singh is a clinician scientist at CCMR, epidemiologist, and gastroenterologist; Associate Professor of Medicine, Departments of Internal Medicine, Community Health Sciences and Biochemistry and Medical Genetics, Rady Faculty of Health Sciences, University of Manitoba.

Dr. Singh co-leads the Manitoba Hereditary GI Cancer Clinic (also known as Lynch Syndrome Clinic) at CancerCare Manitoba. His research interests include prevention and screening for colorectal cancers as well as health outcomes/health services research. He is one of the leads of the team, which established the provincial program to improve detection of those with Lynch Syndrome and improve management of those detected with Lynch Syndrome. Lynch Syndrome is the most common cause of hereditary colon cancer. This provincial program has undergone enhancements based on the quality assessment and improvement projects led by Dr. Singh's team.

Dr. Singh has led several studies assessing risk of colon cancer following colonoscopy, which paved the way to his interest in improving outcomes of colonoscopy. He investigated characteristics and risk factors for colon cancers potentially missed on colonoscopy.

He has led a large integrated knowledge translation project in which a large team assessed the information needs of patients coming for colonoscopy and, using feedback from patients and providers, developed resources for patients undergoing colonoscopy. He is involved in several studies assessing non-invasive/blood markers of colon cancer, so as to improve uptake of screening and detection of colon cancer. He is co-lead of a national study assessing risk of cancers among individuals with Inflammatory Bowel Disease (IBD), a group with increased risk of certain cancers.

## Cancer is in your epi-genes

Dr. James Davie is a Scientist at CCMR and a Distinguished Professor, Max Rady College of Medicine, University of Manitoba.

Dr. Davie has improved our understanding of how genes in normal and diseased cells express themselves, including how a fatty acid named butyrate can arrest the spread of cancer cells. He made this momentous discovery early in his career, and he and his team built upon the success, publishing a series of papers that set the foundation for the development of a new class of anti-cancer drugs. He is the founder of the Manitoba Epigenetics Network and is a member of the Canadian Epigenetics, Environment and Health Research Consortium executive.

Dr. Davie is a recognized leader in epigenetics. Several of his influential findings resulted in knowledge translation towards improving human health.

His early studies set the foundation for the development of histone deacetylase inhibitor drugs, which are approved therapeutics for hematologic malignancies and in clinical trials for a broad range of human disorders.





## *CancerCare Manitoba Research Institute collaboration with The Terry Fox Research Institute*

The Marathon of Hope Cancer Centres Network is a bold vision led by The Terry Fox Research Institute and The Terry Fox Foundation with support from dozens of research and funding partners across Canada. The goal is to accelerate the adoption of precision medicine for cancer through the creation of a pan-Canadian network of designated cancer centres.

Dr. Marshall Pitz, medical oncologist and clinician scientist, is part of the network's steering committee. Together with Dr. Shantanu Banerji, radiation oncologist and clinician scientist, he is part of the Prairie Cancer Research Consortium leadership team.

As a member of this network, CCMB is part of a powerful national collaborative platform where the interprovincial teams will share data, and expertise and apply exciting new technologies to deliver the best outcomes for all patients.

CCMB is actively involved in research projects involving patient data and biospecimens in breast and glioblastoma cancers. Dr. Versha Banerji is leading a project involving the sequencing of chronic lymphocytic leukemia cells. Dr. Shantanu Banerji is leading a project where lung cancer cells will be sequenced. Both projects promise to lead to new insights into further understanding of the diseases.





# New and Innovative Investments for the Future

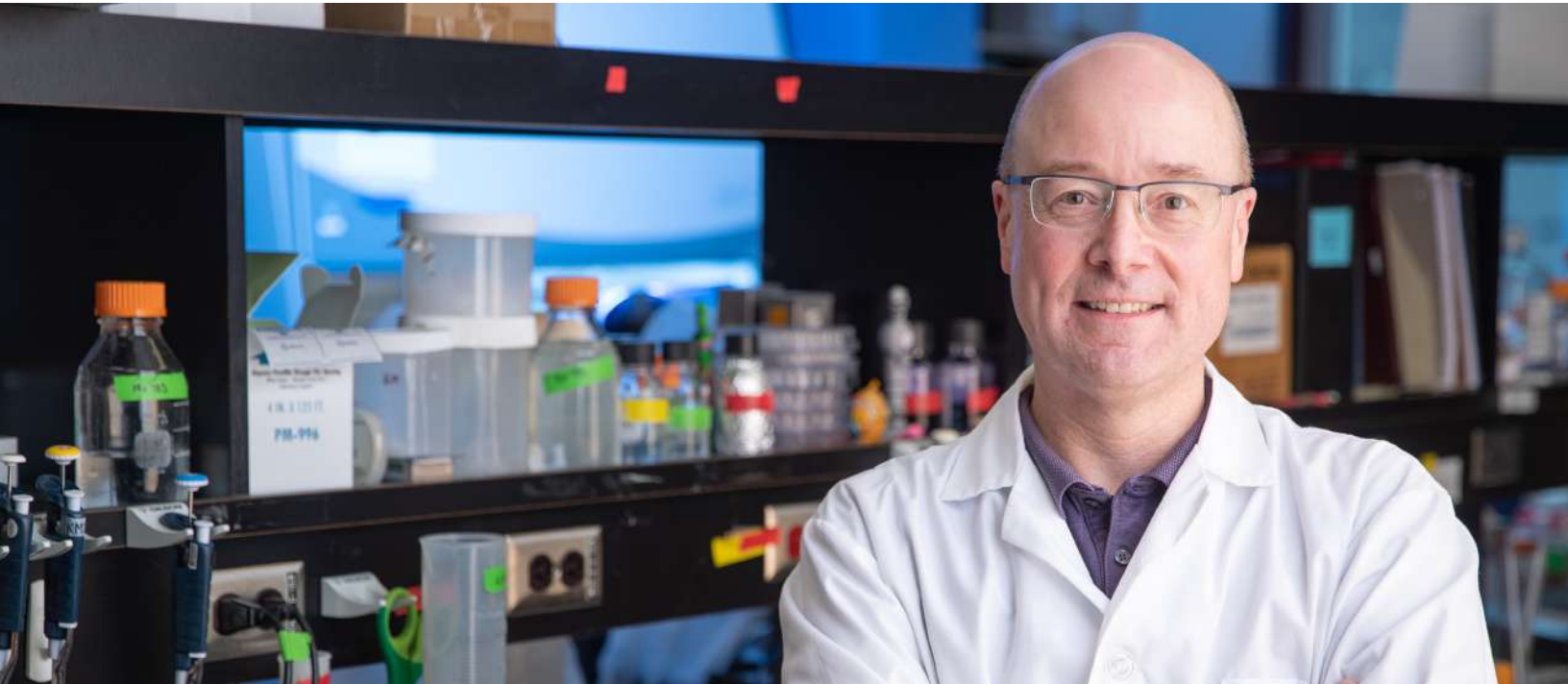
*The CancerCare Manitoba Research Institute is well-positioned to advance research excellence to benefit the people of Manitoba. With the ongoing generous support of donors throughout Manitoba through the CancerCare Manitoba Foundation (CCMF), CCMR is set to accelerate cancer and blood disorders research.*

*Immediate investment is focused on four areas:*

- 1. Single Cell Technologies as New Investment*
- 2. Precision Medicine in Radiation Oncology by bringing MRI to CCMB*
- 3. State-of-the-Art Research Laboratories for the Future*
- 4. New Recruitment*



# Single Cell Technologies as New Investment



Single-cell technologies (SCT) are foundational requirements for cancer and blood disorder research. Understanding cancer at the single-cell level is critical as tumours are not made up of a single population of cells, but rather distinct yet interacting populations of cells. Each cell type has its impact on tumour development, disease progression, response to treatments, and resistance to certain drugs. By identifying and understanding how cells act and interact with each other, the new technologies will provide the necessary insight to identify the molecular events driving cancer development and progression, disease resistance and disease recurrence. With this information, novel biomarkers of disease may be identified that in turn may help inform treatment options.

The importance of this technology to expert scientific recruitment cannot be overstated. The best and brightest scientists take positions in centres that provide research opportunities at the single-cell level. The research enabled and accelerated through the acquisition of this infrastructure will increase visibility and provide opportunities for publication in high-impact journals, which in turn will bolster CancerCare Manitoba Research Institute's (CCMR) ability to attain national and international research grant funding.

Dr. Kirk McManus, Senior Scientist at CCMR, is leading the development of a new central single cell technology (SCT) platform within the Research Institute consisting of six state-of-the-art, leading-edge interconnected technologies that work together as a powerful system and that can be immediately integrated into current research and drive future national fundamental, translational, applied, and clinical research projects and programs.

1. Single Cell Sorting (isolation)
2. Sample Preparation (characterization)
3. High-throughput, Multi-dimensional Imaging Microscopy (quantification)
4. Spatial Tissue & Tumour Biology (quantification)
5. Protein Analyses (quantification)
6. Genome Editing & Regulation (cancer modelling)

The timing for establishing such an important new platform is ideal since the Institute has begun the process of remodelling its current laboratory space and the equipment can be readily incorporated into the latest design and made available to all researchers.



# Precision Medicine in Radiation Oncology by Bringing MRI to CCMB



CCMB Medical Physics Team

We are very fortunate to be receiving and installing a dedicated MRI machine on the radiation floor to enhance radiation treatment planning. This MRI will have the capability to provide advanced functional imaging. The implementation of this treatment program will not only improve the time to treatment for complex cancers but also improve the patient experience and create opportunities to advance research.

The Medical Physics Department of the Radiation Oncology Program at CCMB has a team of excellent scientists trained in medical applications of physics including medical imaging by MRI and radiation oncology domains. This team will be instrumental in providing critical clinical support for the Program. They will also be involved in leading-edge research and innovation activities. This will attract national and international research funding and collaboration.

The focus of research will include, for example in brain tumours:

- Targeting the biological tumour volume for radiation treatment
- Targeting the aggressive area of the tumour
- Assessing the treatment response by applying machine learning

Medical physicists working with radiation oncologists and radiation therapists will develop novel approaches to improve the precision of radiation treatment. This will improve the cancer outcomes of Manitobans.

Internationally known for their research, this team and the leadership strive to push the boundaries of the use of MRI in radiation therapy through innovative clinical applications of advanced MRI technologies.

# State-of-the-Art Research Laboratories for the Future



Anticipated future state

Cancer research in Manitoba is possible thanks to the support of Manitobans through their generous donations to CancerCare Manitoba. It is this visionary funding from our donors through the Foundation that has empowered us to dream, plan, and now build a state-of-the-art preclinical research facility that meets the space and technology needs of the next generation of researchers. This support has enabled the research institute to secure its future.

The state-of-the-art preclinical research facility will transform our laboratory facilities to meet the needs of cancer researchers for the next 20 years through the renovation of the existing laboratory areas on the three research floors at CancerCare Manitoba.

The floors will include:

- State-of-the-art laboratories
- Flexible, modular, scalable multidisciplinary workspace
- Increased capacity for researchers and trainees
- New technologies and equipment

The core infrastructure within the lab floors will be upgraded to allow the facility to continually adapt and meet all future needs.



# Securing our Future

## *Recruitment of CCMR scientists*

The delivery of high-quality cancer services across Manitoba depends on the availability of well-trained, skilled healthcare professionals across many disciplines. This includes clinician-scientists, researchers, and basic scientists.

In 2022, we were very pleased to recruit three new scientists to join CancerCare Manitoba Research Institute.

### **Dr. Cédric Tremblay**

Recruited from the Australian Centre for Blood Diseases (ACBD)/ Monash University, Dr. Cédric Tremblay joined CCMR on September 1, 2022, as a Scientist and Assistant Professor in the Department of Immunology at the University of Manitoba.

Over the past 20 years, Dr. Tremblay has worked on several hematological disorders, ranging from bone marrow failure to acute leukemia. He completed his Ph.D. in Molecular and Cellular Biology (Medicine) at Laval University, Canada, and postdoctoral training at the University of Montreal.

Attracted by the engaging and patient-focused mission of CancerCare Manitoba, Dr. Tremblay crossed the Pacific Ocean to establish his first independent research laboratory. His research program utilizes single-cell multi-omic approaches to investigate the molecular mechanisms that control the fate of normal and malignant hematopoietic stem cells.

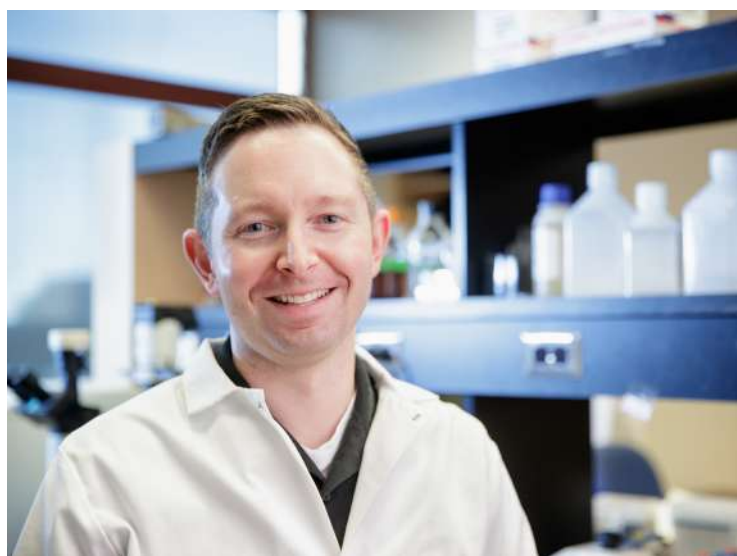


### **Dr. Joel Pearson**

Recruited from the Lunenfeld-Tanenbaum Research Institute at Mount Sinai Hospital in Toronto, Dr. Joel Pearson joined CCMR on September 1, 2022, as a Scientist and Assistant Professor in the Department of Pharmacology and Therapeutics at the University of Manitoba.

Dr. Pearson completed his B.Sc. in Chemical Biology at Thompson Rivers University and his Ph.D. from the University of Alberta where his work focused on the understanding of the molecular basis of the childhood lymphoma, ALK + ALCL.

He pursued post-doctoral work with Dr. Rod Bremner at Lunenfeld-Tanenbaum Research Institute at Mount Sinai Hospital in Toronto where he worked to understand how the fundamental principles of cancer biology can be exploited to identify novel cancer treatments.



Cancer is a complex disease and this complexity hinders successful diagnosis and treatment. Dr. Pearson uses molecular, genomic, proteomic, functional genomic and single cell approaches to understand fundamental aspects of cancer biology. His goal is to identify ways to overcome the inherent complexity of cancer to develop better cancer therapies.

## Dr. Yale Michaels

Coming from the University of British Columbia, Dr. Michaels will be joining CCMR in 2023, as a Scientist and Assistant Professor at the University of Manitoba.

He began his scientific career in Manitoba as a high school research volunteer with Professors Gunnar Valdimarsson, David Eisenstat, and Geoff Hicks.

He went on to obtain a bachelor's degree in molecular and cellular biology from Harvard University where he conducted research in Professor Jack Szostak's lab. He undertook a Ph.D. in Medical Science at Oxford University's Weatherall Institute of Molecular Medicine under the supervision of Professor Tudor Fulga and Professor Tom Milne. As a Ph.D. student, Yale established a new technology for precisely controlling gene expression levels in mammalian cells.

Dr. Michaels' research is currently focused on developing technologies that will enable the next generation of cellular therapies for cancer and immune disease.



Thank you to CancerCare Manitoba Foundation  
for their investment in research.



---

*All funds raised stay in Manitoba.*



# Message from Rady Faculty of Health Sciences, University of Manitoba



We are fortunate in Manitoba to partner with CancerCare Manitoba on innovative and transformative research that impacts cancer patients in Manitoba, Canada and beyond. CancerCare Manitoba Research Institute, a key affiliate of the University of Manitoba affords our UM clinician-scientists and investigators from multiple disciplines an unparalleled opportunity to work collaboratively on today's most relevant cancer research.

We are extremely grateful to have such a strong and longstanding partnership with CancerCare Manitoba that will move forward team science and bring interdisciplinary researchers together to advance patient care.

Dr. Peter Nickerson, Vice-Provost (Health Sciences)  
and Dean





# Message from CancerCare Manitoba Foundation

Leading-edge local research is instrumental in achieving our shared bold vision of a world free of cancer. CancerCare Manitoba Foundation is proud to support the priorities of CancerCare Manitoba including the important work done at the CancerCare Manitoba Research Institute.

It's thanks to the continued generosity of thousands of donors that the Foundation is able to fund innovative research initiatives and the latest technologies and equipment. We know these are essential to creating opportunities for new discoveries and attracting the best and brightest scientists in the world to Manitoba, ultimately leading to better outcomes for those facing a cancer diagnosis.

Patti Smith  
President & CEO

At the Foundation we are fortunate to meet many patients who have benefited from the research that takes place at the Research Institute. These Manitobans of all ages have been given more tomorrows with their loved ones. Their incredible stories of hope and healing inspire donors and whole communities.

Two in five of us will receive a cancer diagnosis in our lifetimes and that is simply far too many. As the Foundation continues to engage Manitobans and raise funds to support advancements in cancer research at CancerCare Manitoba, I am reminded that we can change the course of cancer in this province by working together and supporting local research, leading to new treatments that will save lives.

Lee Meagher  
Chair, Board of Directors





2020

# ROADMAP TO CANCER CONTROL FOR MANITOBA

Setting priorities, working together  
and achieving the best results



# Research and Innovation Foundational to the Priorities of the Roadmap to Cancer Control

## *New knowledge improves cancer control*

CancerCare Manitoba, as the provincial cancer authority, is responsible for planning and leading a provincial cancer control program in Manitoba that includes prevention, diagnosis, treatment and supportive care, as well as research and education in cancer and blood disorders. Through a comprehensive approach we can provide the very best support and care.

CCMB's provincial plan for cancer control, the Roadmap to Cancer Control for Manitoba and its Priorities and Objectives call for the best evidence-based high-quality care for all Manitobans regardless of where they live – care that is patient- and community-centred – care that is driven by research and innovation.

Research is foundational to providing the best care to Manitobans and contributes to cancer control in the province. It informs best practices for patient care, clinical programs, medical training and education. Research is critical to improving patient care and outcomes because it identifies new and innovative treatments and brings the advantageous impacts of clinical trials here in Manitoba.

The Research Institute takes a comprehensive approach, to cancer research by integrating ideas, projects and data from across the cancer journey. This platform is built on Manitoba's longstanding leadership in data capture and analysis at a population level, as well as rich data resources that provide a real-time window into system performance, patient outcomes, psychosocial oncology and screening. For this reason, research in health services innovation is a major priority for building a sustainable, cost-effective and evidence-based approach to cancer care in the community.

Taking discoveries from bench-to-bedside, and back again, is the goal of a comprehensive research program that directly benefits patients. Translational research and clinical innovation are possible when research and clinical services are housed within the same facility where strong collaborations are fostered more readily.

Our integrated research culture attracts the best clinical and research talent from across the world and allows us to ask specific questions about the needs of our local community. In particular, research and innovation projects at CancerCare Manitoba address the needs of Indigenous and vulnerable populations with new approaches to prevention, education and patient navigation.

CancerCare Manitoba is committed to continuous improvement of research efforts which will ultimately translate into improved cancer service delivery and outcomes, as well as keeping abreast of emerging health research discoveries and treatments. Through research innovation, CancerCare Manitoba will positively impact the health outcomes of Manitobans.

In Manitoba, CancerCare Manitoba is well positioned as a comprehensive cancer centre to work together with partners, including the Clinical and Preventive Services Planning, to plan and provide care to all Manitobans. Research is one of the key reasons why.



# Members of CancerCare Manitoba Research Institute 2022

## *Senior Scientists and Scientists*

Dr. Shantanu Banerji  
Dr. Versha Banerji  
Dr. Harvey Max Chochinov  
Dr. James Davie  
Dr. Kathleen Decker  
Dr. Jody Haigh  
Dr. Geoff Hicks  
Dr. Brett Houston  
Dr. Sara Israels  
Dr. James Johnston  
Dr. Sachin Katyal  
Dr. Sabine Mai

Dr. Boyd McCurdy  
Dr. Kirk McManus  
Dr. Yale Michaels  
Dr. Yvonne Myal  
Dr. Mark Nachtigal  
Dr. Joel Pearson  
Dr. Stephen Pistorius  
Dr. Marshall Pitz  
Dr. Afshin Raouf  
Dr. Cédric Tremblay  
Dr. Ryan Zarychanski

## *Affiliate Scientists*

Dr. Naseer Ahmed  
Dr. David Dawe  
Dr. Jeffrey Graham  
Dr. Julian Kim  
Dr. Rami Kotb  
Dr. Saroj Niraula  
Dr. Sapna Oberoi

Dr. Alok Pathak  
Dr. Kristjan Paulson  
Dr. Emily Rimmer  
Dr. Lawrence Ryner  
Dr. David Szwajcer  
Dr. Magimairajan Issai Vanan

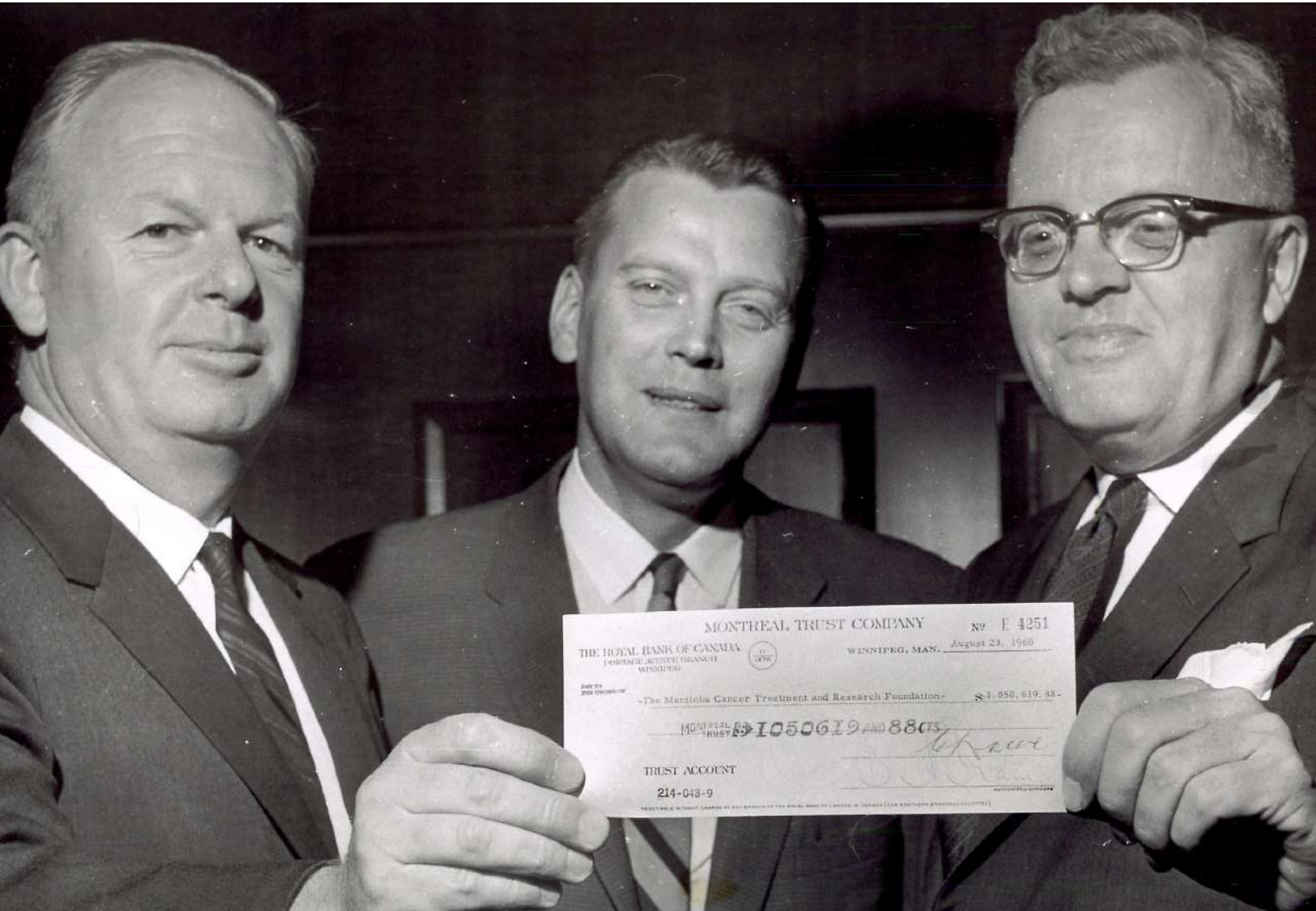
## *Adjunct Scientists and Members*

Dr. Alon Altman  
Dr. Michael Charette  
Dr. Geoff Cuvelier  
Dr. Britt Drogemoller  
Dr. Renée El-Gabalawy  
Dr. Marco Essig  
Dr. Saeid Ghavami  
Dr. Davinder Jassal  
Dr. Biniyam Kidane  
Dr. Christina Kim  
Dr. Aaron Marshall  
Dr. Donald Miller

Dr. Paul Park  
Dr. Jeff Saranchuk  
Dr. Jai Jai Shiva Shankar  
Dr. Tanveer Sharif  
Dr. Anuraag Shrivastav  
Dr. Harminder Singh  
Dr. Donna Turner  
Dr. Tamra Werbowetski-Ogilvie  
Dr. Roberta Woodgate

# The Generosity and Vision of Manitobans

*Making an Impact on Cancer Care and Research for Decades*



## **Winnipeg Free Press - Wednesday, August 31, 1960**

Million dollar smiles were flashing when Darryl Laird, right, former chairman of the Manitoba Blue Cross, presented Dr. Richard Walton, left, Executive Director of the Manitoba Cancer Treatment and Research Foundation, with a cheque for \$1,050,619.88. Health Minister George Johnson looks on. This is approximately equivalent to \$10.3 million dollars today.



---

E-mail us at [CCMBCPAffair@cancercare.mb.ca](mailto:CCMBCPAffair@cancercare.mb.ca)  
[www.cancercare.mb.ca](http://www.cancercare.mb.ca)

 @CCMBResearchInstitute

 @CCMB\_Research