



Meeting the
Cancer Challenge

2020



CANCER RESEARCH IN CALGARY
Report to the Community

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2020 Report to the Community

A joint report by the Tom Baker Cancer Centre and
the Arnie Charbonneau Cancer Institute

Calgary, Alberta | January 2021

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ARNIE CHARBONNEAU CANCER INSTITUTE

MESSAGE FROM THE CHARBONNEAU CANCER INSTITUTE DIRECTOR

Dear Friends, Colleagues, Trainees, and Staff,

I am thrilled to have the opportunity to serve as the next Director of the Charbonneau Cancer Institute. As Deputy Director for the past seven years, I've seen our talented scientists, trainees, and staff evolve into a highly successful group.

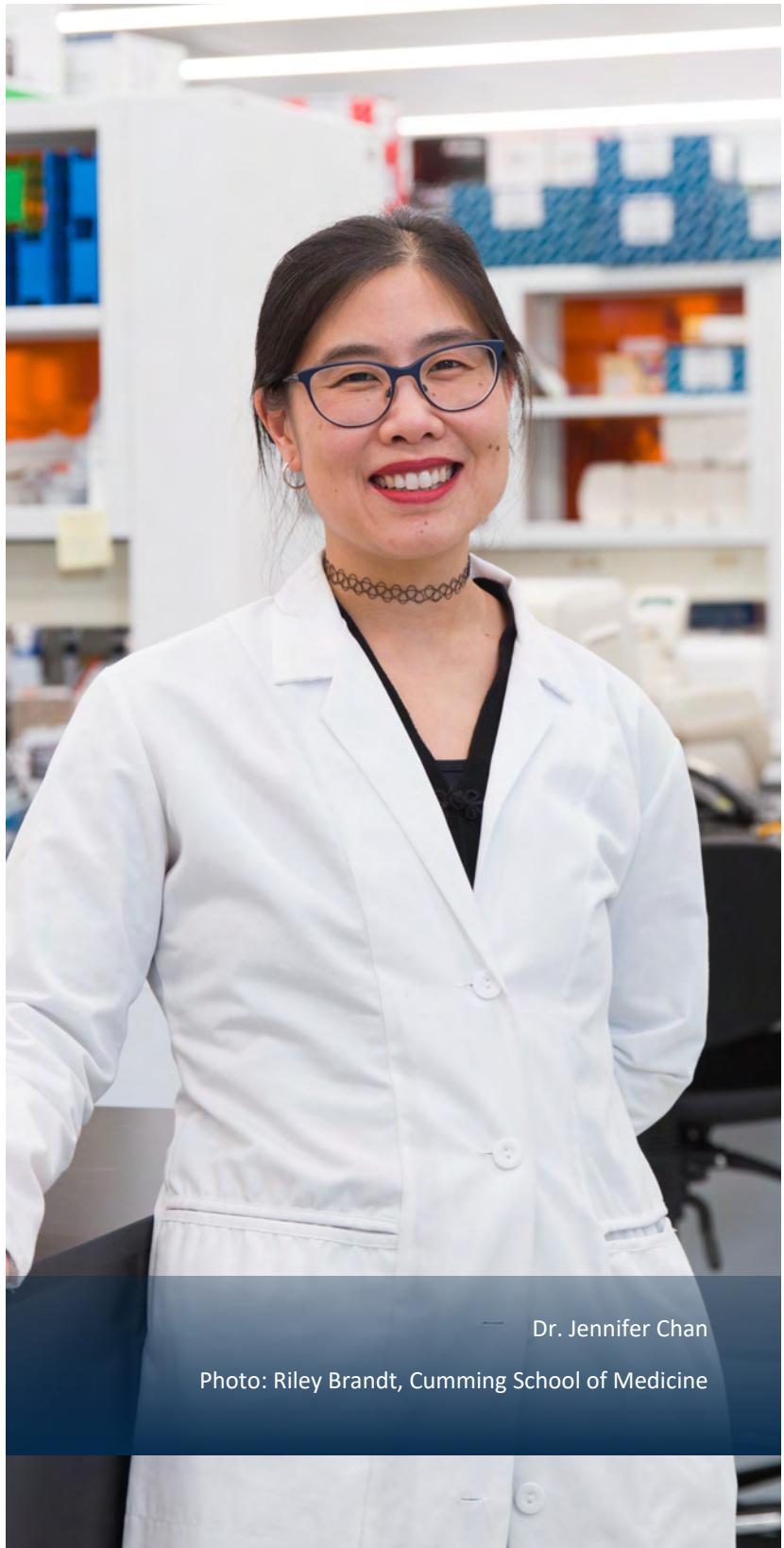
I am excited to build on those past successes and will make every effort to enable all of us to achieve our collective vision of meeting the cancer challenge through the research we conduct and education we provide.

The next couple of years will be busy, as we get ready for the opening of the new Calgary Cancer Centre and work to leverage the tremendous research opportunity it will afford. However, we are well positioned to expand our impact and deliver research that will improve the well-being of patients with cancer in Calgary and beyond.

Sincerely,

Jennifer A. Chan, MD

Director, Arnie Charbonneau Cancer Institute
Associate Professor, Pathology & Lab Medicine



Dr. Jennifer Chan

Photo: Riley Brandt, Cumming School of Medicine

TOM BAKER CANCER CENTRE

MESSAGE FROM THE MEDICAL DIRECTOR AND HEAD OF ONCOLOGY

Dear Friends and Colleagues,

This past year was challenging in many ways, but our resilience as a community of advocates, friends, clinicians, researchers, trainees, and staff who are dedicated to the cancer mission has not wavered. Despite the ongoing burden of the pandemic, we have been tremendously fortunate this year, for the generosity of our community, the success of our researchers in national grant competitions, and the adaptability of our clinical fellows and trainees. Your commitment to providing excellent care to patients and families has also not wavered and I thank you for the ongoing dedication you bring to your role.

We are excited to see what 2021 has in store, particularly as we prepare for the new Calgary Cancer Centre. The future is bright for cancer research and education and we continue to have much to look forward to.

Sincerely,

Don Morris, MD, PhD

Medical Director, Tom Baker Cancer Centre,
Professor and Head, Department of Oncology



Dr. Don Morris

Photo: Jared Sych, courtesy of Alberta Cancer Foundation

ARNIE CHARBONNEAU CANCER INSTITUTE

A LEGACY OF LEADERSHIP

J. Gregory Cairncross, MD

Arnie Charbonneau Cancer Institute
Director, 2013-2020

In 2013, Dr. Gregory Cairncross took on the role of Institute Director and over the next seven years would help usher in a new era for cancer research in Calgary, catalyzed by a generous gift from Calgary businessman and philanthropist, Mr. Arnie Charbonneau.

Greg's leadership has helped shape the Institute into the broad, inclusive, and increasingly successful network of scientists it is today. He not only worked to create an entity where all cancer researchers, regardless of where they worked, could find a home among colleagues with complementary interests and where the next generation of cancer scientists could thrive as Institute trainees; he also worked to position the Institute as a research partner to the health system, including Cancer Care Alberta.

Arguably, one his greatest achievements has been to inspire us to become stronger together. We are forever grateful to Dr. Cairncross for his leadership over the past seven years.





Dr. Gregory Cairncross

Photo: Kelly Johnston, Cumming School of Medicine

HIGHLIGHTS FROM 2020



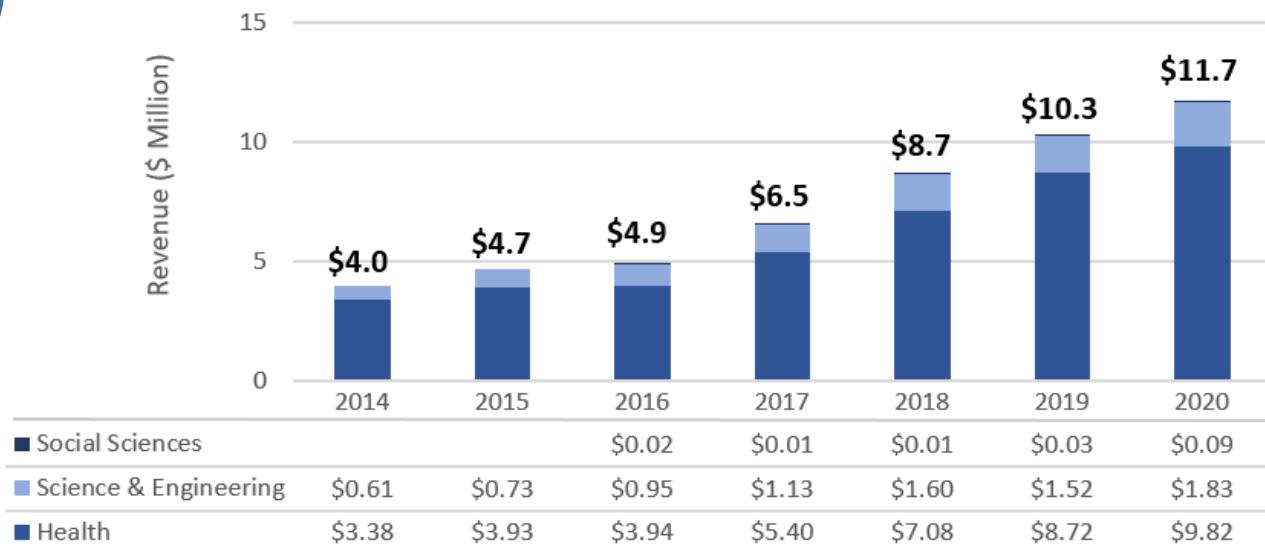
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A partnership agreement between Cancer Care Alberta and the Cumming School of Medicine for cancer research in Calgary was executed in July 2020, enabling:

- ◆ the creation of a comprehensive and integrated vision for cancer research in Calgary;
- ◆ a tangible connection point—a cancer research institute—between research at Cancer Care Alberta, including the Tom Baker Cancer Centre and future Calgary Cancer Centre, and cancer researchers at the Cumming School of Medicine;
- ◆ joint governance and the leveraging of shared resources;
- ◆ harmonized research processes;
- ◆ a single banner for cancer fundraising; and
- ◆ enhanced opportunities for cancer scientists and their trainees.

2

Federal Tri-Council funding earned by Calgary cancer researchers hit an all-time high in 2020.



3

Exterior construction of the Calgary Cancer Centre was nearly complete as of November 2020.



Theme 1: Improving Cancer Treatment



Dr. Nizar Bahlis and Dr. Paola Neri

Photo: Carmen Coelho, Charbonneau Cancer Institute

THEME 1: IMPROVING CANCER TREATMENT

Calgary Takes Big Leap Forward in the Provision of Immunotherapy

In August 2020, the Government of Alberta announced a partnership with the Alberta Cancer Foundation that will provide \$15 million to a new cancer treatment program offering CAR T-cell therapy, a very promising immune-based therapy for specific types of leukemia and lymphoma. Alberta will be the third province to offer such a program and the Tom Baker Cancer Centre will be the first facility in Alberta to offer CAR T-cell therapy to patients, starting this coming winter.

CAR T-Cells for Multiple Myeloma

Dr. Nizar Bahlis, Associate Professor of Hematology at the University of Calgary, is an internationally recognized expert in immunogenomics. He has recently generated some exciting data at the single-cell level from patients treated with CAR T-cell therapy in multiple myeloma, a cancer that affects plasma cells in the bone marrow. His work represents a step forward in being able to treat additional malignancies with CAR T-cells.

Putting Research into ACTION

Dr. Douglas Mahoney, Assistant Professor of Microbiology, Immunology, & Infectious Diseases at the University of Calgary, leads a new program, the Alberta Cellular Therapy & Immune Oncology (ACTION) initiative. ACTION is focused on developing new CAR T-cell therapies right here in Alberta and includes a phase I trial component for these locally made treatments. A generous private donation along with matching funds from the Canadian Cancer Society has helped launch the new initiative.



Dr. Douglas Mahoney

Photo: Carmen Coelho, Charbonneau Cancer Institute

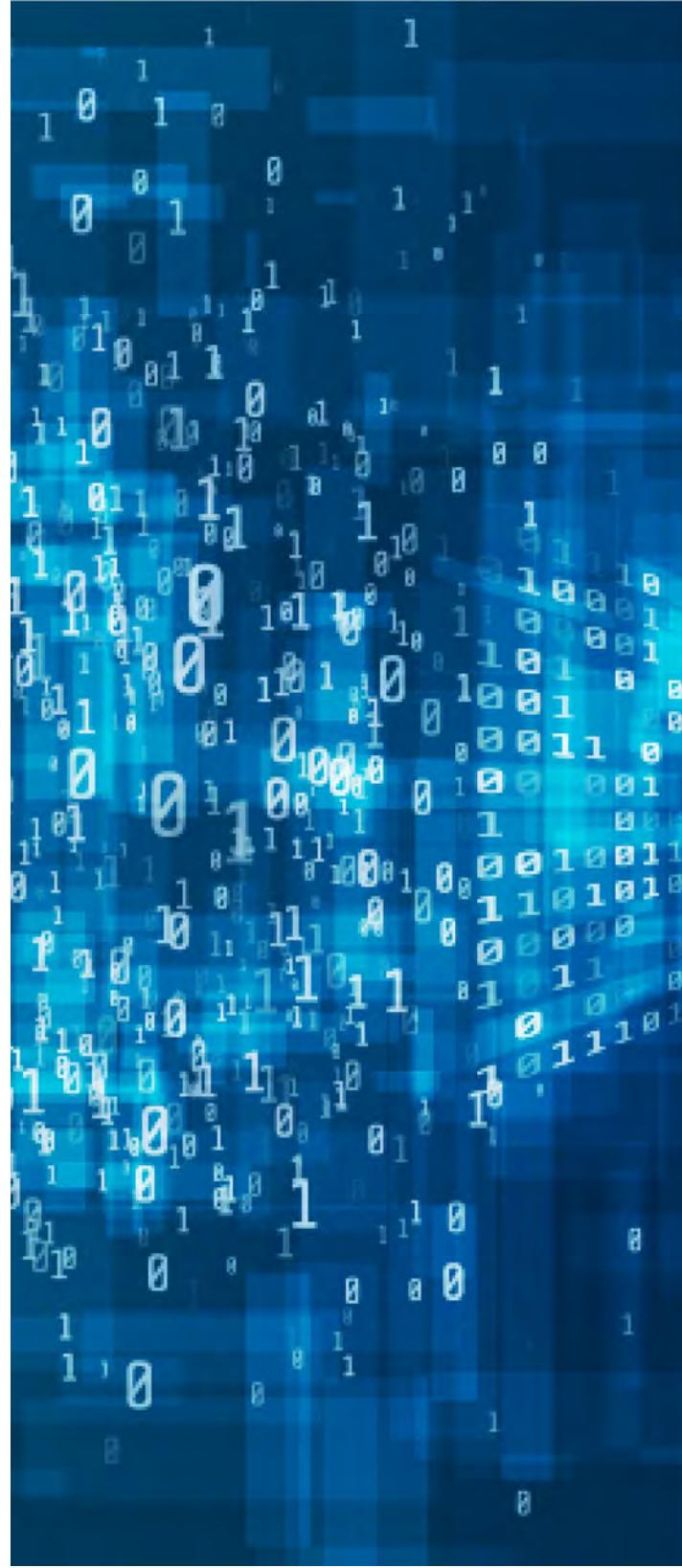
Improving Radiotherapy via Artificial Intelligence

Medical Physics Team Harnesses the Power of AI for Better Outcomes

Artificial Intelligence (AI) is a vital tool to rapidly assess complex information to better inform and continually improve cancer care. The medical physics group, led by Drs Charles Kirkby, Philip McGeachy, and Wendy Smith, is using AI to solve a variety of problems around the delivery of radiation therapy.

Cancers of the head and neck can be highly complex and often require adaptive decision making. For example, in the face of toxicities and other considerations, the question often arises regarding whether to continue the patient with the current treatment or to modify the plan to adapt to changes in the patient's condition. Algorithms are mathematical formulas that can track a patient's changing anatomy and help answer such questions. The medical physics group has established novel AI methods to assess software performance for adaptive decision-making.

For brachytherapy, a form of localized radiation therapy, choosing the right applicator is crucial to delivering the correct dose while minimizing the exposure of healthy tissue to radiation. The group designed an AI-based decision support tool that clinicians can use to predict which device is best for cervical cancer brachytherapy. AI can also help assess the quality and outcomes of radiotherapy given to prostate cancer patients. One study conducted by the group resolved statistically significant differences in radiotherapy plan quality metrics to establish common protocols and defined benchmarks across Alberta. In another study, AI identified hidden factors that make a difference in long term treatment outcomes.



Cutting-Edge Technology coming to Calgary

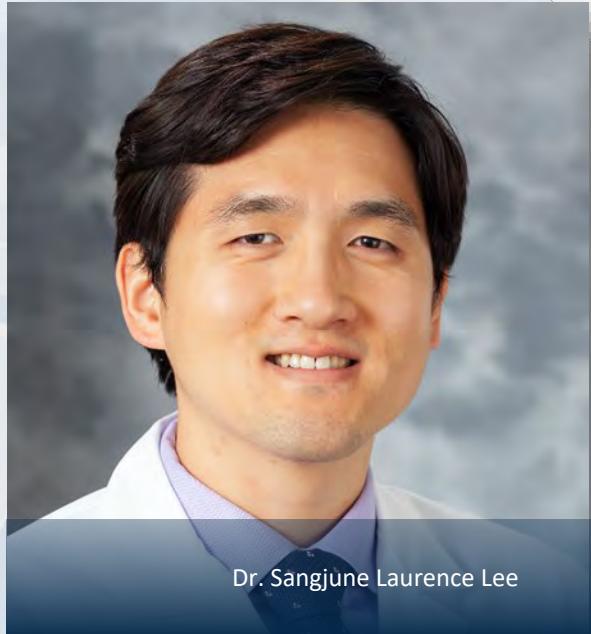
The First Hybrid Radiation and MRI Machine Will Soon Treat Patients

The Tom Baker Cancer Centre's Radiation Medicine program is thrilled to see the MR-Linac Program at the new Calgary Cancer Centre set to become a reality. Under the leadership of Drs. Kundan Thind and Sangjune Laurence Lee, clinical and research teams have been working on site design, technology selection, and clinical trial design for the program.

The integrated system, called MR-Linac, combines magnetic resonance imaging (MRI) with a linear accelerator to guide radiotherapy in real-time. This technology enables precise radiation delivery to cancerous tumours, while maximally preserving nearby healthy tissues. The Calgary Cancer Centre will be the first centre in Canada and amongst a few elite cancer institutions in the world with two MR-Linacs.

The MR-Linacs will enable a tremendous opportunity to initiate clinical trials with cutting edge research to enhance patient care. In preparation for this research, the Radiation Medicine program has joined the Elekta MR-Linac Consortium, which includes researchers and clinicians that are leading clinical trials and other research efforts worldwide on the MR-Linac platform. The MR-Linac program will also be a catalyst for research innovation and will support the training and education of future clinicians and researchers, while offering Albertans the most innovative clinical treatments available in the world.

Acquisition of the MR-Linacs has been made possible through the support of the Alberta Cancer Foundation.



Dr. Sangjune Laurence Lee



Dr. Kundan Thind



New Approaches to Precision Radiotherapy

Toward Effective Breast Radiation with Fewer Long Term Side Effects

The Divisions of Radiation Oncology and Medical Physics have teamed up to design a phase 2 clinical trial (ACCEL), which aims to evaluate the effectiveness of a lower dose and more conveniently delivered partial breast radiation regimen (5 fractions over 1 week) for early breast cancer, while reducing radiation toxicity. Led by Dr. Petra Grendarova, a radiation oncologist at the Tom Baker Cancer Centre, and Dr. Sarah Quirk, a medical physicist at the Tom Baker Cancer Centre, and funded in part by the Alberta Cancer Foundation, this interdisciplinary collaboration has already resulted in four new publications with final trial results due in 2021. If successful, the trial will demonstrate the ability to achieve tumour control with fewer long term side effects.

A More Precise Way to Deliver Radiation to Patients

Brachytherapy is a form of radiotherapy that delivers the radiation to a precise location, without harming nearby organs. It is especially useful for the treatment of tissues in sensitive regions. Medical physicist Dr. Tyler Meyer, along with other members of the Tom Baker Cancer Centre Brachytherapy Research Group, initiated five major projects in 2020 through the support of funding by the Alberta Cancer Foundation. Two of the five projects were clinical trials that have begun accrual, including an international flag-ship clinical trial for locally advanced cervical cancer (EMBRACE II). A partnership was initiated with Robarts Research Institute and Western University towards the application of pre-clinical imaging technology to enable intraoperative guidance (and more precise placement) of brachytherapy implants. Each of the projects will reach patients within three years and the translation of these technologies into clinical practice will improve the quality of the radiation treatment and the patient experience.

Radiation as a Potential Treatment for COVID-19 Patients?

Dr. Charles Kirkby has a long standing interest in novel applications of radiotherapy. When the COVID-19 pandemic reached Canada in 2020, he began investigating whether the radiation that's used to treat cancer could also be used in the most severe COVID-19 patients to treat acute respiratory distress. Prior to WWII there was some evidence of radiation successfully treating patients with pneumonia. Low doses of radiation (lower than cancer treatments, but higher than medical imaging) has been shown to induce anti-inflammatory immune responses that could potentially calm the cytokine storm associated with the disease. Dr. Kirkby, along with colleague Dr. Marc Mackenzie, proposed this idea in a series of letters to the journal, *Radiotherapy & Oncology*. Further work, later published in *Physics in Medicine and Biology*, reconstructed historically delivered doses using Monte Carlo simulations, establishing a clear dosing envelope for the reported effects. There are now nearly a dozen clinical trials registered at clinicaltrials.org investigating low dose radiotherapy as a potential treatment for COVID-19 respiratory distress, with promising initial results.

Calgary Researchers Driving Forward Precision Care

Lung Cancer Database Generates New Research and Spurs Collaboration

The Glans-Look Research program published or presented several pieces of work this past year, established a new clinical database, and generated three new industry-sponsored projects. They presented exciting new data and engaged with patients and other researchers at the first-ever virtual Glans-Look Research Day in November. Donor Allen Knight reflected, “13 years ago, Hugh Borgland and I set out to fulfill a request from our close friend Jim Look to create a project to help other lung cancer patients...This project has evolved into a profound research platform through the vision of Dr. [Gwyn] Bebb which will lead to epic changes [in] treating lung cancer.” Hugh Borgland concurred, “I believe Jim would be very proud that the data bank has been developed and is now being used by many researchers.”

Precision Oncology Hits Key Milestone

In partnership with the International Microbiome Centre, the Calgary Metabolomics Centre, and the Hematology Translational Labs, the Precision Oncology and Experimental Therapeutics (POET) program launched tumour profiling using sequencing platforms attained collaboratively with the Centre for Health Genomics and Informatics; tumour profile data from 85 patients are now being discussed by oncologists and scientists during clinical rounds to inform case management. Another 18 patients are submitting serially collected samples for interrogation using advanced technologies in a polyomic fashion. The international POET Congress, held virtually this year, again hosted high calibre international speakers who discussed new concepts and approaches to precision oncology. Growth of the POET program is due to the generosity of Mr. Arnie Charbonneau, who believed genetic information and individualized, targeted treatment should be available to all patients.



Translational Research Lab Brings Personalized Medicine to Patients with Cancer in Real-Time

The Precision Oncology Hub (POH) is Accelerating the Translation of New Research Discoveries Into Improved Treatment Options

Cancer is characterized by a complex interplay between various molecules at the site of the tumour and intra- and inter-tumour heterogeneity. Therefore, molecular studies are extremely important for the understanding of the disease biology in individual patients, the identification of druggable targets, and the delivery of a personalized and tailored therapeutics. Such approaches are critical to guide the selection of combination drug therapies for cancer patients, while minimizing the use of potentially ineffective therapeutics and hence lessening any potentially harmful side effects.

To deliver on the potential of personalized medicine, the Precision Oncology Hub, led by Dr. Paola Neri, has built a multi-disciplinary team of experts in molecular biology and computational analysis to perform, interpret, and report molecular testing into routine day to day clinical practice. Key research infrastructure, such as genomic sequencing machines and advanced imaging systems, that were recently acquired have enabled the lab to conduct in-house sequencing, analysis, and reporting on a cell-by-cell basis across entire tissue sections, making “real-time” personalized treatment decision making a reality.



THEME 1: IMPROVING CANCER TREATMENT

Clark Smith Centre Makes Key Discoveries About Brain Cancer Origins and Therapeutic Targets

Glioblastoma, or GBM, is a very serious and usually fatal illness that can strike in the prime of life. It is one of the cancers for which there have been no major breakthroughs in treatment. Today's revolutionary immunotherapies that activate the immune system to fight cancer, and new precision drugs that dramatically shrink certain cancers, do not yet work for GBM.

Potential New Targets for Brain Cancer Therapy Discovered

Drs. Sam Weiss, Artee Luchman, and Ian Restall of the Department of Cell Biology and Anatomy, have discovered a new way to block the growth of glioblastoma cells, by stopping the activity of the enzyme glutaminase in vitro (i.e., in cells taken from a brain tumour); however, the response varied from complete blockade of brain tumour cell growth to absolute resistance. Their findings uncover a unique metabolic vulnerability in brain tumour cells and support future work to try and therapeutically target upstream and downstream components of the disease pathway. Moreover, they demonstrate that the expression of certain gene patterns can alter the metabolic requirements of the cancer cells. Dr. Ian Restall is a Clark H. Smith post-doctoral fellow.

Drs. Steve Robbins and Donna Senger, both from the Department of Oncology, identified an immune molecule called IL-33 that plays a major role in brain tumour development. Certain cells in the brain environment, such as macrophages and microglia, can impact the development of glioblastoma and prevent a durable response to treatment. They found that IL-33 leads to the recruitment and activation of immune cells that further allow the tumour to grow. Conversely, when the action of IL-33 is blocked, glioblastoma growth decreases and survival increases. Their data suggest that the immune system plays an important role in brain cancer development and that therapies targeting the immune system, not just the tumour itself, could offer benefit.

Back to Basics: How Do Brain Cancers Begin?

Drs. Michael Blough and Greg Cairncross have taken a step back to consider glioblastoma from a new angle; they are trying to understand how brain cancers develop in the first place. "Armed with knowledge about the very beginning of a GBM, we will soon be able to think more strategically about ways to prevent, intercept, or treat this terrible cancer; and I'm excited to report that we're making real progress", says Dr. Blough. This Clark Smith team has been able to make GBMs in the lab (in a dish) using stem cells from the mouse brain and a well-known molecule that is made in the brain. Their simple method leads to cancerous changes in stem cells. These cancerous cells are special for two reasons: first, they grow in the brains of mice where they look exactly like human GBMs, and second, they have the same changes in DNA that are characteristic of human GBM. Says Dr. Cairncross, "We are developing the first authentic model of human GBM, which is teaching us how GBM begins. Until now, we have been trying to treat a cancer that we do not understand. Today, I am optimistic that we are on the right track and soon will be able to find ways to lessen the risk of getting a GBM, and also learn how to treat it".



Dr. Michael Blough and Dr. Gregory Cairncross, Clark H. Smith Brain Tumour Centre

Helping Young Women with Breast Cancer Thrive

Calgary Breast Surgeon One of Six Recipients of Canadian Team Grant Focused on Cancer Survivorship

Dr. May Lynn Quan is a general surgeon with a clinical specialization in breast surgery. She is also a Professor with the Departments of Oncology, Surgery, and Community Health Sciences at the University of Calgary. Her research interests focus on improving outcomes for patients with cancer—particularly, young women with breast cancer—and to do this, she uses a variety of research approaches and methodologies. Having received numerous funding awards and support throughout her career for her research in both the health services and clinical domains, Dr. Quan is well positioned to make impactful and long-lasting changes to the survival trajectory for young women with breast cancer.

Most recently, she was one of six researchers across Canada to be awarded a Cancer Survivorship Team Grant sponsored jointly by the Canadian Cancer Society and the Canadian Institutes for Health Research. The grant, valued at \$1.15 million over 5 years, will fund the project, “Preparing to Survive”, which aims to address some of the psychosocial (mental and emotional) challenges experienced by newly diagnosed young women with breast cancer during the acute treatment phase and into the survivorship period.

Dr. Quan is also the Scientific Director of Strategies for Precision Health in Breast Cancer (SPHERE), a program that collaborates with providers, patients, and advocates and focuses on improving breast cancer outcomes through precision medicine, big data, and machine learning approaches.



Dr. May Lynn Quan

Calgary Surgeons Leading the Way Toward New Standards

World Class Surgical Standards Allow Patients to Come Home Sooner

Dr. Gregg Nelson, a gynecologic oncologist at the Tom Baker Cancer Centre and a Professor with the Departments of Obstetrics & Gynecology and Oncology, is passionate about patient recovery following surgery. Over the past seven years he has led the development of and study of several 'enhanced recovery after surgery' protocols for cancer surgery. These protocols help cancer patients recover better and faster with fewer complications, which allows them to start additional therapy such as chemotherapy and radiation, without delay. He is now working with cancer surgeons across Alberta to implement and study these guidelines, which is hoped to improve long-term outcomes for those undergoing complex surgeries.

Plastic Surgeons Notified of Patients Who May Require Exchange of Implants

The option for breast reconstruction is an important component of care for women with breast cancer who undergo mastectomy. However, the recent discovery of 'Breast Implant Associated Anaplastic Large Cell Lymphoma' (BIA-ALCL) related to textured breast implants requires women with implant-based reconstruction to be informed about BIA-ALCL to make decisions about monitoring and/or exchange.

Dr. Temple-Oberle took the initiative to help surgeons and patients navigate this uniquely iatrogenic disease by mining data, available through a reconstruction surgical reporting system, to alert Alberta plastic surgeons of patients who had textured implants and would need to be contacted. She published on the decline of the use of textured implants over the past five years, indicating plastic surgeons were responding to reports of BIA-ALCL. Dr. Temple-Oberle is now delivering monthly group presentations about BIA-ALCL to patients, followed by individual consults to develop a personalized care plan for each patient.



Biomarkers: Toward Less Invasive Approaches

Researchers Hopeful that Molecular Biomarkers in Men Undergoing Active Surveillance for Prostate Cancer Can Help Guide Treatment

Dr. Tarek Bismar is a Professor of Pathology & Laboratory Medicine at the University of Calgary and Alberta Precision Labs. He has partnered with Calgary urologist Dr. Eric Hyndman at the Prostate Cancer Centre to investigate novel molecular signatures in men with prostate cancer who are undergoing active surveillance (monitoring of their early stage disease). They aim to develop clinical signatures that could guide how often to re-biopsy patients during surveillance and when to begin definitive therapy, such as surgery or radiotherapy. Through this work, they aim to establish “Precision Active Surveillance Guidelines” for use in Alberta and elsewhere and hope that the guidelines will reduce unnecessary biopsies and avoid potential complications for patients. To fuel this work, Dr. Bismar obtained over \$1.1 million in funding from a Prostate Cancer Canada Team Grant. He is using whole genomic profiling along with artificial Intelligence to characterize the signatures.

Made-in-Calgary Molecular Test for Thyroid Cancer Reaches the Clinic

Over-diagnosis and over-treatment of thyroid tumours places strain on the healthcare system and leads to reduced quality of life for patients. A multidisciplinary team led by Dr. Ralf Paschke, Dr. Markus Eszlinger, and PhD student Paul Stewardson, has achieved another critical milestone in improving the care pathway to distinguish benign from malignant thyroid tumours. Their molecular test, ThyroSPEC™ is now in use for all indeterminate thyroid tumours through a partnership with Alberta Precision Laboratories. This personalized health approach guides difficult clinical decisions based on individual biomarkers, informing medical and surgical decision making to effectively reduce over-treatment. The test can also identify targetable mutations in recurrent thyroid patients.

Cancer Risk is Encoded by DNA Fingerprints in Inborn Genomes

Five to ten percent of all cancer cases are inheritable, whereas the remaining 90% have their roots in environments and lifestyles. By applying machine learning to 10,000 germline genomes of patients representing 22 types of cancer, Dr. Edwin Wang, Professor of Biochemistry and Molecular Biology at the University of Calgary, and his the team have discovered seven cancer-associated DNA “fingerprints” of genomes. One DNA-fingerprint was well represented among individuals with cancer, as compared to individuals without cancer, suggesting that it could be a universal inheritable trait that encodes for cancer risk. Another DNA-fingerprint was highly well represented in patients who had smoked tobacco, as compared to those who were non-smokers, indicating that those with damage from tobacco smoke may bear a common DNA-fingerprint that indicates a higher risk for cancer. Dr. Wang believes that these DNA-fingerprints can be used as cancer risk biomarkers and may have relevance to other genetic diseases.

Early Intervention May Prevent Bone Factures

Blood Test Holds Promise As a Way to Identify Patients at High Risk of Bone Metastasis

Dr. Carrie Shemanko, along with co-investigators, Drs. Nancy Nixon, Karen Kopciuk, Winson Cheung, Qingrun Zhang, and Doug Mahoney have identified blood-based biomarkers that could hold the key to detecting bone metastasis earlier than is currently possible and allow care providers to intervene sooner.

Breast cancer grows in the bone in the majority of cases when the disease has spread. One of the most common and unfortunate ways of being alerted to the growth of cancer cells in the bone has been by the occurrence of a fracture, once the cancer has spread and bone damage has already occurred. Dr. Carrie Shemanko and her team, with funding from the Early Cancer Detection Initiative and the Alberta Cancer Foundation, are identifying and testing blood-based biomarkers that could more rapidly identify patients at risk for bone metastasis, with the goal of early treatment to reduce or prevent bone damage.

Patients in the 'Breast to Bone Metastasis' Research Program are contributing to this research by donating samples to the team for study. With additional funds from the Cancer Research Society, Dr. Shemanko is also in the process of screening for a drug, already available in our medicine cabinets, that could be repurposed for bone metastasis treatment. She was awarded a Parex Innovation Fellowship in 2020 for her innovative research.



Dr. Carrie Shemanko

Noteworthy Discoveries for the ‘Close Watch’ List



Dr. Jürgen Gailer

Cancer Chemist Discovers Anticancer Activity from Bimetallic Metal Compound is Stable in Plasma

Dr. Jürgen Gailer, Professor of Chemistry with the Faculty of Science at the University of Calgary recently discovered that a bimetallic metal complex that displays anticancer activity can remain stable in human plasma for up to 60 minutes. These results suggest that Titanocref administered intravenously could hold promise as a future candidate for drug testing in clinical trials. The next step would be to determine the efficacy and safety of the complex in animal and human studies.



Dr. Thomas Brenn

Molecule Involved in Skin Adnexal Tumours Identified

Skin adnexal tumors are a rare group of skin cancers that vary depending on where they arise (sweat glands, sebaceous glands, or hair follicles) and can remain benign or become malignant with the potential for metastasis and mortality. Therapies are limited, as the molecular pathways are poorly understood. Dr. Thomas Brenn, Professor of Pathology & Laboratory Medicine, and collaborators have undertaken the first explorative genetic analysis of a group of skin adnexal tumors using whole exome sequencing and identified a molecule (NF- κ B) involved in the central pathway. Based on these findings, which were published in *Nature Communications*, the team has obtained a grant from Cancer Research UK to study the genetic landscape of the entire spectrum of skin adnexal tumors in the hopes of identifying diagnostic markers and therapeutic targets.



Dr. Mike Monument

“Cold” Tumours Can Become “Hot” (and Treatable)

Sarcoma is a devastating diagnosis, accounting for 15-20% of cancers in children and young adults. Dr. Michael Monument and his research team have developed several immune competent models of osteosarcoma and soft tissue sarcomas, which are enabling research on new sarcoma immunotherapies. They recently demonstrated that activation of certain immune factors (STING pathway) can turn “cold” and non-responsive tumours into “hot” tumours that respond durably to treatment. Their research is now expanding by evaluating STING therapy in combination with radiation, surgery, and other immunotherapies. They are developing new viral-based approaches to more efficiently activate STING in tumours and hope to utilize their sarcoma models to enable prospective clinical trials evaluating STING-based immunotherapies in Alberta.





CALGARY'S CANCER RESEARCH THEMES

Theme 2: Improving the Patient Experience

THEME 2: IMPROVING THE PATIENT EXPERIENCE

It's About the Patient

Person-Centered Radiation Oncology Program Aims to Improve the Patient Experience

In 2020, the Tom Baker Cancer Centre launched the Person-Centered Radiation Oncology Service Enhancement (PROSE) program, a new initiative aimed at improving the experience of patients through a number of quality improvement and research initiatives. The program has quickly expanded to include a program coordinator and a research fellow.



Person-centered Radiation
Oncology Service Enhancement

PROSE has already begun implementation of several quality improvement and research projects. One project includes a cross-sectional baseline study on patient experiences while in the radiation department. This project has led to a new qualitative study to further understand how to improve the experience of patients with lung cancer. A second study is underway to test the feasibility and acceptability to patients of implementing a patient-reported outcome measure into routine clinical practice in the head and neck population.

According to Department of Oncology Clinical Research Coordinator Demetra Yannitsos, PROSE is a unique program within Canada, with an entire portfolio dedicated to the improvement of person-centered care and patient/family experience within the radiation department. The team hopes to establish long-term positive impacts on routine clinical care and patient experience, as well as to become a program from which care providers and professionals in other health disciplines and jurisdictions can learn.

THEME 2: IMPROVING THE PATIENT EXPERIENCE

Coping with Cancer During the Pandemic

Dr. Linda Carlson Leads a Team of Canadian Researchers Studying the Impact of the Pandemic on the Mental Health of Survivors

A team of researchers from the Canadian Cancer Trials Group Supportive Care Committee have spearheaded a study of more than 1,000 cancer survivors from across the country who are either receiving treatment for cancer, or who are at 10-years post-treatment.

The study, "Living with Cancer in the Time of COVID-19", asks participants to complete over the next year, a series of surveys covering the impact of the pandemic on mental health and quality of life, including levels of stress, worries, depression, changes in cancer care, and even positive changes that may have resulted from the pandemic.

The researchers hope the data will help us understand the full impact of the pandemic on this potentially vulnerable group, and devise strategies to help better support cancer survivors as we navigate this difficult time.

Dr. Linda Carlson is a psychosocial oncologist and Professor in the Department of Oncology at the University of Calgary.

Those interested in participating or learning more can find additional details at: <https://covid19livingwithcancer.ca>



THEME 2: IMPROVING THE PATIENT EXPERIENCE

Improving Life After Cancer: the Science of Caring

Dr. Fiona Schulte and Team Awarded Funding from CIHR to Study the Impact of Cancer on Social Adjustment in Childhood Cancer Survivors

Dr. Fiona Schulte, Adjunct Assistant Professor and registered clinical psychologist, has built a successful research program in pediatric psychosocial oncology. In 2019 and 2020, she was awarded over \$1 million in operating funds to study the impact of cancer and its treatment on social adjustment in survivors of childhood cancers. The impact of Dr. Schulte's work is best exemplified through her contributions to international guideline development for survivors of childhood cancer. She is co-chair of the Children's Oncology Group (COG) Long-Term Follow-Up Guidelines Psychosocial Task force, and serves as co-chair of the International Late Effects of Childhood Cancer Guideline Harmonization Group (IGHG) psychosocial task force.



Dr. Fiona Schulte

Oncology Sexual Health Lab at the University of Calgary Ramps Up Work to Help Patients with Cancer Overcome Sexual Dysfunction

Dr. Lauren Walker, Adjunct Associate Professor and registered clinical psychologist, established and now directs the University of Calgary's Oncology Sexual Health Lab. She is nationally recognized for her expertise in cancer-related sexual dysfunction, having established several innovative clinical programs including the provincially operated Oncology and Sexuality, Intimacy, and Survivorship (OASIS) program, the international Androgen Deprivation Therapy Education Program, and several sexual rehabilitation programming initiatives. This past year she focused her attention on adolescent and young adult cancer survivors with fertility needs and adults with multiple myeloma or lymphoma, who may experience sexual dysfunction.



Dr. Lauren Walker

THEME 2: IMPROVING THE PATIENT EXPERIENCE

Empowering Patients at the End of Life

Team of Palliative Specialists, Led by Drs. Aynharan Sinnarajah and Jessica Simon, Works to Improve Well-Being Through to End of Life

People living with cancer, and those close to them, experience high levels of distress when faced with a life-limiting diagnosis, and often don't know that palliative care can be received at the same time as cancer treatments as an added layer of support. The Palliative Care Early and Systematic (PaCES) Project team has been studying the implementation of a new pathway for an early integrated palliative approach to care for people living with colorectal cancer. The emerging results suggest that clinics that implemented the pathway are achieving earlier palliative referrals and that patients are benefiting.

In addition, the PaCES team has secured new funding from the Canadian Institutes of Health Research to develop and study the acceptability of a process where all patients diagnosed with advanced, incurable lung cancer would be automatically offered phone consultation by a skilled palliative care provider.



Maximizing Patient Wellness and Survivorship After Treatment for Blood Cancer

New Survivorship Guidelines Post-Treatment

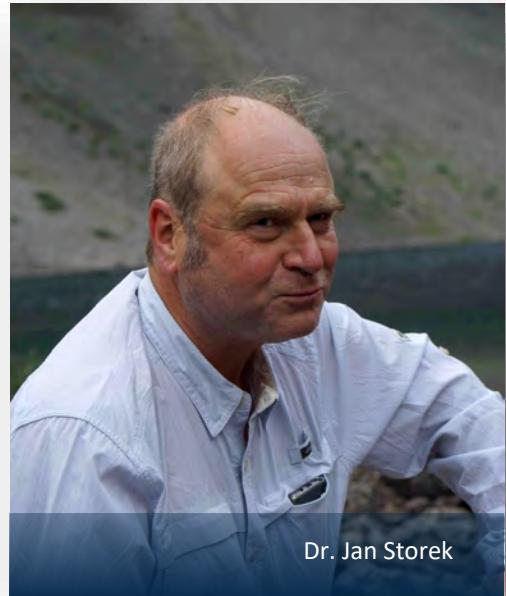
Dr. Greg Guilcher, an Associate Professor of Pediatrics and Oncology and the Program Director of Pediatric Hematology and Oncology at the University of Calgary, has an interest in acute and late toxicities of cancer therapies, including hematopoietic cell transplantation. He is the site principal investigator for a national pharmacogenomics collaboration which aims not only to discover genetic predictors of toxicity but to translate this testing into the clinic in a practical way. He serves as Chair of the Children's Oncology Group (COG) HCT/Immune/Dermatology Late Effects Taskforce. In 2020, the Taskforce undertook a review to update the high impact COG Survivorship Guidelines, and Dr. Guilcher led a COG scoping review (of published literature) of immune function in survivors, and the development of practice changing recommendations.



Dr. Greg Guilcher

Allergy Cure or Acquisition: a Benefit or a Risk of Treatment for Cancer of the Blood?

Blood or bone marrow transplantation has been used to treat blood cancers like leukemia for over 50 years. During transplantation, the patient's immune system is exchanged for a healthy donor's immune system. Since an allergy is an abnormal immune response to substances like pollens or dust mites, Dr. Jan Storek and his team hypothesized that patients with an allergy could become cured if the donor does not have an allergy. They also hypothesized that if the donor is allergic and the patient is not, the recipient would become allergic (allergy transfer), representing an additional risk of transplantation. Through their research, they found that allergies were cured in about 60% of cases (of allergic patients with nonallergic donors) and that, surprisingly, the transfer of allergy (from an allergic donor to a nonallergic patient) occurs only rarely (1 of 11 patients studied). These results suggest an additional benefit of receiving the transplantation (on top of curing the blood cancer).



Dr. Jan Storek



Dr. Greg Guilcher and Dr. Jan Storek are both members of the Childhood Cancer and Blood Disorders Research Program, a collaboration between the Arnie Charbonneau Cancer Institute and the Alberta Children's Hospital Research Institute



CALGARY'S CANCER RESEARCH THEMES

Theme 3: Decreasing Cancer in the Population

Photo: Riley Brandt, University of Calgary

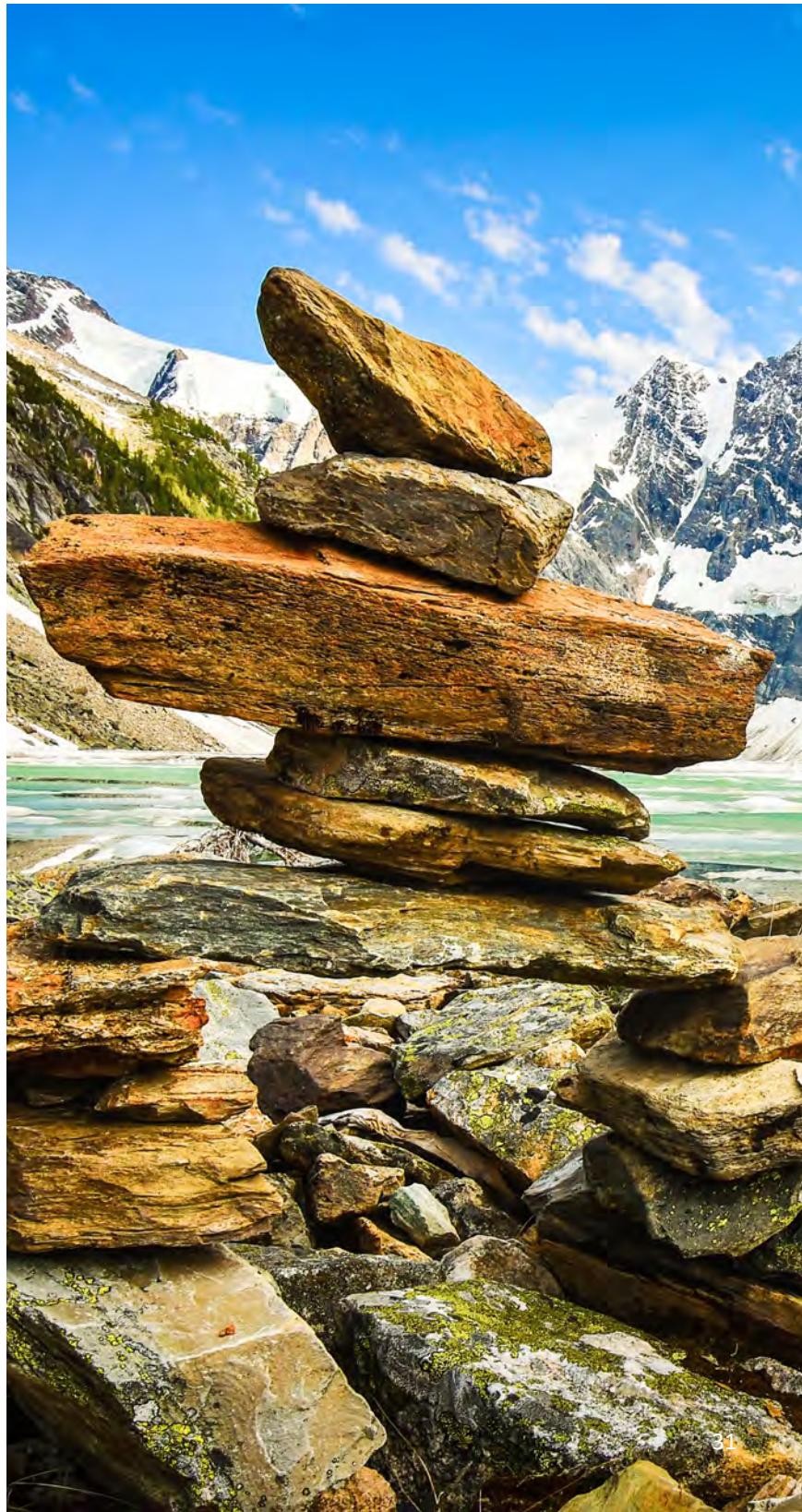
THEME 3: DECREASING CANCER IN THE POPULATION

Honouring Truth and Reconciliation

Cancer Screening Project Aims to Address Gaps in Access to Care for First Nations People

First Nations people experience a higher cancer burden compared to their non-Indigenous counterparts. In this co-designed/co-led project, Dr. Karen Kopciuk, Cancer Epidemiology and Prevention Research Scientist (Cancer Care Alberta) and Dr. Huiming Yang, Medical Director of Screening Programs (AHS) partnered with the Alberta First Nations Information Governance Centre to develop a system-level approach to measuring the quality and timeliness of cancer screening and follow-up care among AB First Nations people. By building on culturally safe processes that were previously established through the work of two collaborative partnerships with Alberta First Nations, community gatherings at the start and end the project enabled First Nations elders, knowledge holders, and community members to provide their perspectives.

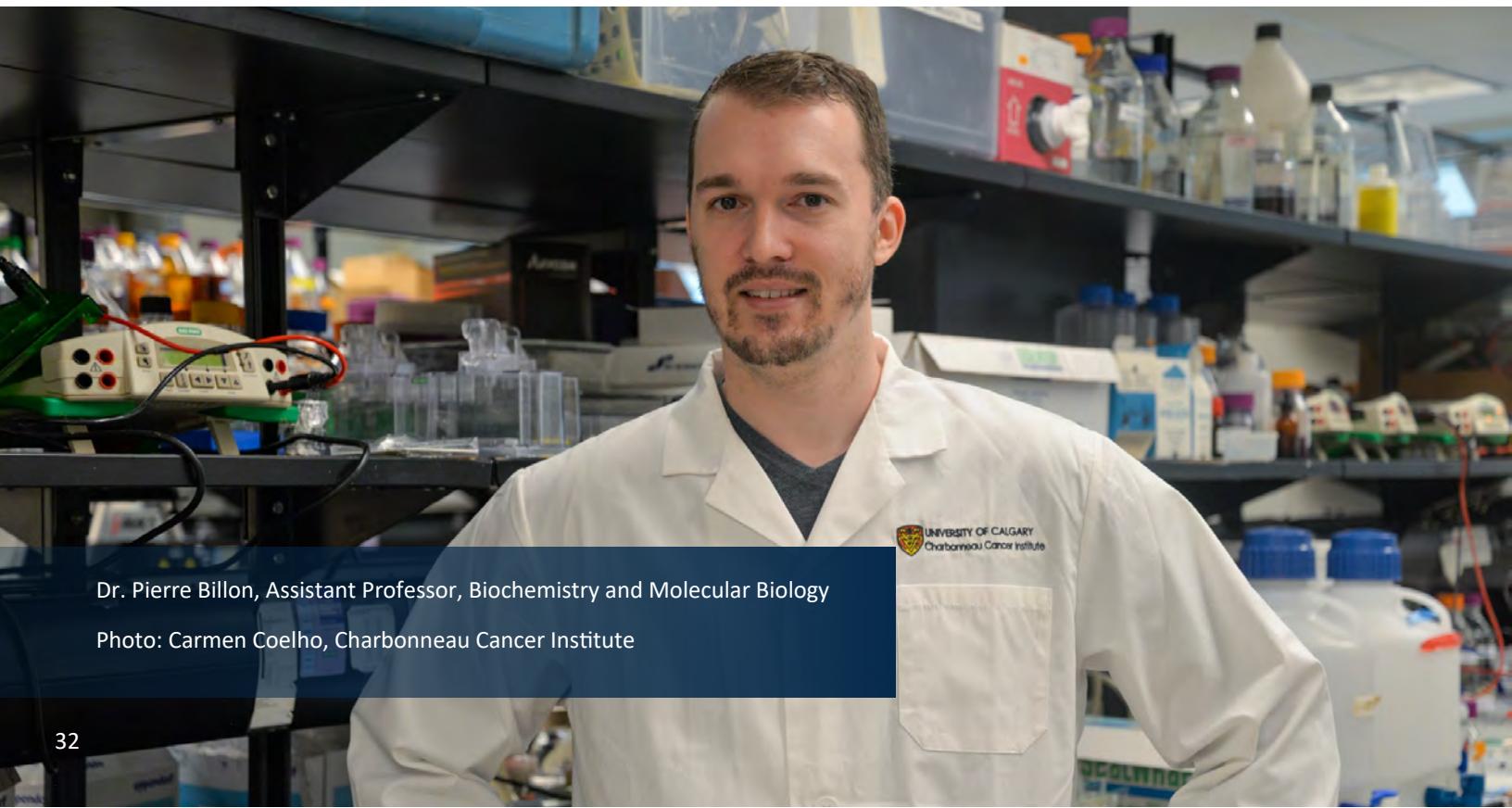
The CIHR-funded project identified inequities for First Nations people, in each cancer screening program, breast, cervical, and colorectal, with results evaluated from both Western and Indigenous perspectives. First Nations partners and cancer screening leaders are now sharing the results with communities, AHS leadership, and the Wisdom Council, proposing solutions to address the inequities, and planning future research on cancer screening activities and outcomes to measure progress toward equitable care for First Nations people.



Robson DNA Science Centre Expands Expertise with DNA Repair and Genome Editing Scientist

The Billon Laboratory is Studying the Mechanisms That Promote DNA Repair and Using Cutting-Edge Genome Editing Technologies

Dr. Pierre Billon completed his PhD in the laboratory of Dr. Jacques Côté at the Cancer Research Center at Laval University. The main focus of his work was to study the functional roles of post-translational modifications of DNA replication and repair factors. Next, Pierre joined the laboratory of Dr. Alberto Ciccia at the Columbia University Irving Medical Center for his postdoctoral training where he studied the connection between cellular DNA repair mechanisms and genome editing technologies. He developed new tools, methods, and technologies, resulting in an expansion and improvement of the genome editing toolbox, with applications in cancer detection and treatment. In November 2020, he opened his own laboratory within the Charbonneau Cancer Institute.



Dr. Pierre Billon, Assistant Professor, Biochemistry and Molecular Biology

Photo: Carmen Coelho, Charbonneau Cancer Institute

Radon Research Gets a Federal Funding Boost

The Goodarzi Laboratory Expands Efforts to Tackle Radon Nationally

Canada has a significant and worsening problem with radioactive radon and metallic arsenic environmental exposure, which is currently responsible for thousands of high lethality cancers each year. A collaborative group, the 'Cancer risks of Arsenic & Radon Environmental exposures (CARE) Team, aims to implement a national research program to reduce the future burden of high-fatality cancers caused by arsenic and radon exposure in Canada. Together with the Canadian Partnership for Tomorrow Projects (CPTP), and with recent and significant infrastructure funding received by the Canadian Foundation for Innovation for a collaborative grant with Dalhousie University, the team will develop new methodologies of assessing human exposure to radon and/or arsenic, provide Canadians with the essential skills to take this mission forward, and implement findings through evidence-based health policies.

A key driver of this work is the Evict Radon Campaign, which was successfully incorporated in 2020 as a national non-profit tackling Canada's radon problem. Dr. Aaron Goodarzi, Canada Research Chair for Radiation Exposure Disease and Associate Professor of Biochemistry and Molecular Biology, leads the campaign and is dedicated to reducing the incidence of lung and other cancers caused by radon exposure. His research aims to understand what types of property produce a high or low radon environments and why, identify who in society is most at risk of cancer from radon exposure, and inform meaningful policies to engineer high radon out of our future buildings.

To learn more visit www.evictradon.org



Dr. Aaron Goodarzi



THEME 3: DECREASING CANCER IN THE POPULATION

Physical Activity: Not Just for Prevention . . .

Long-Term Study Shows 2.5 Hours per Week of Physical Activity Can Reduce Risk of Death After Cancer

Dr Christine Friedenreich, Scientific Leader for the Department of Cancer Epidemiology and Prevention Research (Cancer Care Alberta), and her team reported results from a prospective cohort study that measured pre- and post-diagnosis physical activity and survival outcomes up to 18 years after a diagnosis of endometrial cancer.

This study, published this year in the high impact *Journal of Clinical Oncology*, was the first observational study conducted worldwide that had collected comprehensive data on lifetime total physical activity, measured just after diagnosis, as well as post-diagnosis physical activity, measured three to four years after diagnosis. The investigators found improved survival amongst women who were the most active after diagnosis.

They also noted a survival benefit for those who maintained or increased their levels of recreational activity after diagnosis. Reductions in the risk of death were substantial: women in the highest one-third of physical activity compared to those in the lowest one-third reduced their risk of mortality associated with endometrial cancer and other causes of mortality by up to 60%.

These benefits were realized with just 150 minutes a week of moderate to vigorous intensity physical activity. This study has provided strong (long-term) evidence that maintaining or increasing physical activity after a diagnosis of endometrial cancer could improve survival outcomes.

... but Also a Means for Cancer Survivorship

Cancer Prevention Scientist Ranks Top in the Country in National Survivorship Grant Competition

Dr. Lin Yang, Cancer Epidemiology and Prevention Research Scientist at Cancer Care Alberta and adjunct assistant professor with the Department of Oncology at the University of Calgary, is interested in the role of physical activity in improving long-term outcomes for patients with prostate cancer.

Dr. Yang's previous work from a large cohort of prostate cancer patients who underwent surgery as part of their treatment has demonstrated the beneficial effects of pre-surgical physical activity in improving urinary and sexual outcomes afterwards. She has since obtained funding from a grant competition by the Canadian Cancer Society, in which she ranked first across all of Canada, to conduct a prehabilitation trial testing the use of mind-body exercise in patients with prostate cancer before undergoing surgery, and whether the exercise can improve psychosocial and physical functioning, and surgical outcomes. In collaboration with researchers from multiple disciplines, healthcare providers, and community members, this project will generate novel knowledge on how to harmonize exercise in the prostate care pathway in a simple, efficient, and non-disruptive way to improve patient experience and outcomes.

Dr. Yang's research program integrates methods from clinical research, epidemiology, and implementation science to study the associations and biological mechanisms of physical activity, sedentary behavior, diet and obesity with important outcomes.



Dr. Lin Yang

New Link Uncovered Between Cancer and Aging

Research by Former Charbonneau Trainee Nancy Adam Explores Link Between Cancer and Aging Via 'Shoelace-Like Structure', the Telomere

A research project undertaken by Dr. Nancy Adam, co-supervised by Drs. Tara Beattie and Karl Riabowol and supported by the Robson DNA Science Centre and Arnie Charbonneau Cancer Institute with funding from NSERC and CIHR has challenged the dogma that telomere length is the major factor affecting cell aging. Cell aging (aka senescence) is the first major line of defense against cancer since it limits the cancer cell's ability to replicate, and so blocks cancer cell growth. In contrast to the previously held belief that only telomere length, or a subset of short telomeres initiate senescence and that cancer cells avoid cell aging by maintaining a particular telomere length, Nancy found using super-resolution microscopy, that senescent cells have lower density telomeres that undergo 53BP1-mediated telomere clustering and induce senescence signaling. Conversely, short telomeres in cells expressing hTERT variants that do or do not elongate remain compacted, cluster-less, and do not initiate senescence. Should cancer cells with short telomeres show the same behaviour, this work will help determine the mechanism by which cancer cells escape senescence and identify future targets to block the growth of most cancer cells that typically exhibit short telomere length.



Dr. Nancy Adam, Arnie Charbonneau Cancer Institute

Photo: Carmen Coelho, Charbonneau Cancer Institute

THEME 3: DECREASING CANCER IN THE POPULATION

Unique Partnership Leads to New Innovation

Innovative New Way to Study the Radiation from Radon Invented By UCalgary and AHS Research Team

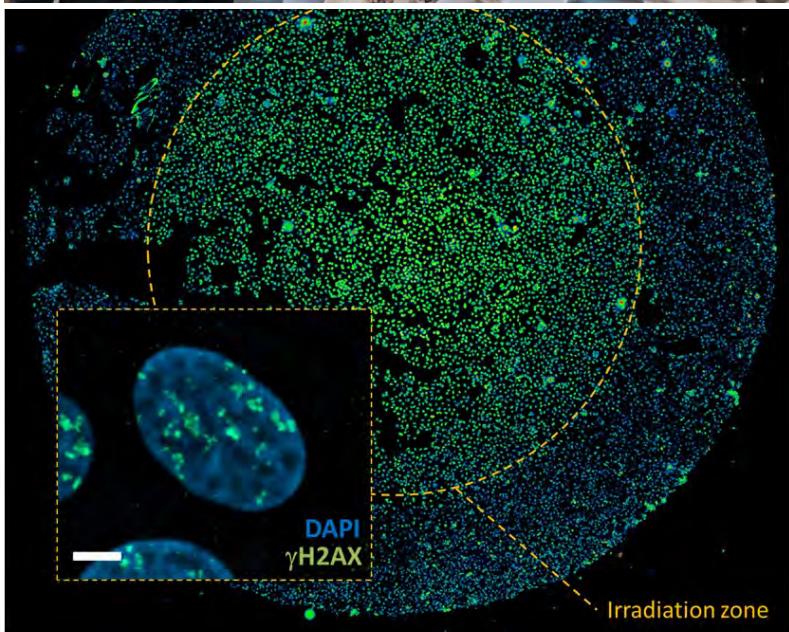
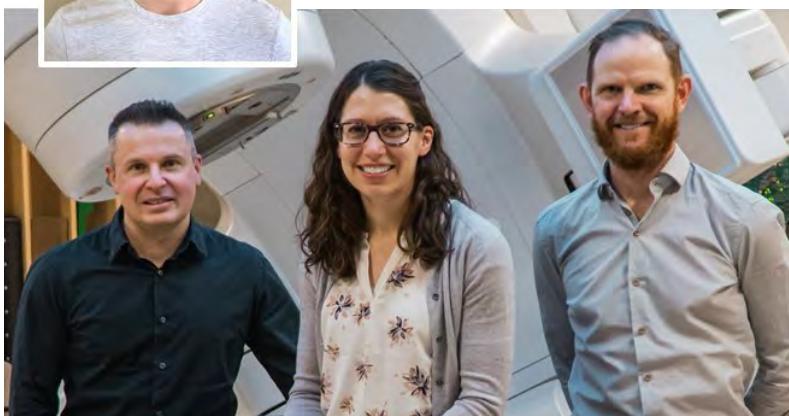
Lung cancer is the most lethal cancer in Canada. It is caused by tobacco smoke and/or repetitive, prolonged inhalation of radioactive radon gas. The alpha particle radiation that is emitted by radon produces highly complex DNA damage that is difficult for cells to repair without inducing cancerous genetic mutations, and represents the majority of most people's lifetime exposure.

Despite this, technological limitations to deliver alpha particles conveniently, repetitively, in low doses and in an affordable, high throughput manner within the laboratory have limited research on this topic. Indeed, restricted and time-limited access to necessary but very costly particle accelerators confines this work to a minority of researchers globally, and makes certain key experiments uneconomical or impractical for all.

After nearly three years of hard work and innovation, a partnership between Charbonneau scientists based at the University of Calgary and Alberta Health Sciences recently published a game-changing way of delivering alpha particles in the laboratory, revolutionizing how scientists can study the effects of radon gas exposure on human cells. This new technology is simple and cheap to make, high throughput compatible, resilient to human error, accurate and precise in radiation dose delivery, able to hit >100,000 cells per experiment, and adaptable for use with widely used genetic model organisms, such as yeast. This model has already enabled led to new grant funding from CIHR to study the radon-induced lung cancer gene signature.



Top, left to right: John Danforth, Aaron Goodarzi, Fintan Stanley, Dustin Pearson. Inset: Daniel Berger.
Bottom, left to right: Nicolas Ploquin, Hali Morrison, Greg Pierce



Above: High resolution microscopy image of normal human cells (DNA (DAPI) shown in blue) with DNA damage (γ H2AX, in green) within one well of a 96 well plate, having been exposed to alpha particle radiation (within the yellow circle). Inset shows a zoom-in of the nuclear DNA of one cell.

A photograph showing a medical professional in blue scrubs holding a stethoscope. A patient's arm is visible, with a purple tourniquet on the upper arm and a needle inserted into a vein, with a small amount of blood being drawn into a clear plastic tube.

CALGARY'S CANCER RESEARCH THEMES

Theme 4: Driving Care Via Real World Evidence

THEME 4: DRIVING CARE VIA REAL WORLD EVIDENCE

Alberta Advantage: Big Cancer Data

Oncology Outcomes (O2) Group Leads the Way



With in-kind contributions from the Arnie Charbonneau Cancer Institute, support from the Tom Baker Cancer Centre, and help from industry partners, the Oncology Outcomes (O2) group was co-founded in 2019 by Drs. Winson Cheung and Darren Brenner to position Calgary as a major hub for health outcomes research and real-world evidence (RWE) generation. Whereas clinical trials evaluate whether a drug will work in a small group of carefully selected patients who tend to be younger and fitter, RWE seeks to determine whether a drug will work in the larger general population, including older and frailer patients. RWE is generated from ‘big data’ collected from over 90% of the population, so findings are more representative of patients’ in the “real world”.

In 2020, the O2 Group received a grant from the Alberta Cancer Foundation to examine how pancreatic cancer is managed in the real world and to characterize ways to optimize its diagnosis and treatment. The team also received a Servier Alberta Innovation Health Fund Award to integrate machine learning and artificial intelligence into their data holdings and elevate their analytical capacity. One example of such work is the development of an online calculator using data from the cancer registry and electronic medical records to predict the risk of patients discontinuing chemotherapy early: <http://www.oncocare.ca/oncocalc/>

The O2 Group is mentoring trainees to become real-world data scientists and methodologists. Their trainees were recognized in 2020 with an American Society of Clinical Oncology merit award (Dr. Atul Batra) and a Canadian Institute for Health Research post-doctoral fellowship award (Dr. Devon Boyne).



Dr. Winson Cheung

Photo: Jared Sych, courtesy of Alberta Cancer Foundation

Invaluable Lessons from Overseas Residencies

Dr. Alexander Paterson Shares His Insights on Value of Observerships and Resident Training Overseas

The Department of Oncology has participated for many years in the Cumming School's Global Health Programmes. Initially these activities comprised teaching visits by faculty to centres mainly in South-East Asia, such as Southern Philippines, Laos, and Nepal, and encompassed Medicine and General Surgery. It would later involve specialists—oncologists, hematologists, medical physicists, and nursing staff. Visiting and teaching evolved into more formal training fellowships at the University for selected overseas residents with shorter observerships for more experienced medical staff. Some attachments involved technology transfer. Oncology's have included medical physics, pathology, medical oncology, and palliative care.

The importance and relevance of these global relationships has now been accepted by medical leaders because of the bi-directional learning opportunities. Visiting and observing the management of different diseases within different health care systems deepens and broadens the learner's knowledge and perspective. The University of Calgary now has Memoranda of Understanding between several centres throughout the world, including Ateneo de Zamboanga Medical School, University of Nicaragua at Managua, and the Aga Khan University in Kenya, Uganda and Pakistan. Palliative Care teams have worked with "Two Worlds" in Nepal. The principles learned by participating in global oncology are relevant when working locally with less privileged groups, such as remote indigenous communities.



Global Citizenship in Action: Calgary to Laos

Dr. Christopher Brown Receives Professor Clarence Guenter Distinguished Achievement Award

Since 2002 Dr. Christopher Brown along with his wife, Dr. Jane Lemaire, and a small number of other Cumming School of Medicine faculty members have been traveling annually to the developing Southeast Asian nation of Laos for several weeks at a time to participate in the University of Calgary/Laos Partnership in the Reform of Medical Education.

The work by this team has supported the modernization of undergraduate medical education, the creation of a Family Medicine Specialists residency training program, and support of Continuing Medical Education opportunities for program graduates in the remote district hospitals and rural villages where they work.

In recent years, the first cancer center in the country has been opened. The leadership of that institution recognize the limitations of their capabilities and have discussed with Dr. Brown their hope to identify partners interested in advancing oncology practice in Laos. Dr. Brown sees a unique opportunity to act as a bridge between Tom Baker Cancer Centre and Department of Oncology with colleagues, fellow oncologists and health leaders, in Laos.

Incorporating Patients' Priorities for Research

Cuthbert Lab Identifies Top Patient Research Priorities for Colon Cancer

To determine priorities for research that will help people with colorectal cancer (CRC) live better, a multi-organizational project led by the Cuthbert Lab asked patients, carers, and health care professionals across Canada to identify what future research would most benefit those affected by the disease. From these responses, 30 key questions were identified and through consensus, distilled down the top research priorities. Presented below are the top five research questions:

1. What are the most effective ways to prevent recurrence?
2. What additional initiatives are needed to improve rates of screening and how does this apply to screening for those who are under the age of 50?
3. How can long term changes to bowel function (including having an ostomy) be best managed, what is the role of rehabilitation in managing changes to bowel function, and are there new ways of managing this side effect that are being investigated?
4. What is the role of personalized medicine, including immunotherapy, to tailor treatments based on patient and tumor characteristics? Can personalized medicine improve efficacy while decreasing side effects of CRC treatment?
5. Are we able to find a test that is more sensitive or specific when used for screening for CRC?

Dr. Colleen Cuthbert, an Assistant Professor with the Faculty of Nursing, was awarded a prestigious Canada Research Chair in Cancer Survivorship in 2020.



Dr. Colleen Cuthbert



TRAINEE AWARDS AND RECOGNITION

CIHR Fellowships

Dylan O'Sullivan (Dr. Darren Brenner)
Devon Boyne (Dr. Winson Cheung and Dr. Darren Brenner)
Michael Johnston (Dr. Marco Gallo)

CIHR Canada Graduate Scholarship Master's Award

Karys Hildebrand (Dr. Michael Monument)

Alberta Graduate Excellence Scholarship (AGES)-International

Anusi Sarkar (Dr. Shirin Bonni)

Alberta Graduate Excellence Scholarship (AGES)

Joseph Madamesila (Drs. Nicolas Ploquin and Ekaterina Tchistiakova)

2020 Vanier Canada Graduate Scholarship

Jahanara Rajwani (Dr. Doug Mahoney)

Clark Smith Brain Tumour Studentship

Hiba Omairi (Dr. Greg Cairncross)
Varsha Thoppey Manoharan (Dr. Sorana Morrissey)

Cumming School of Medicine (CSM) Postdoctoral Scholarships

Charbonneau Scholar - Dr. Sharon Hou (Dr. Fiona Schulte)
Clark Smith Scholar – Dr. Shaghayegh Bolandi (Dr. John Kelly)
Robson DNA Scholar (Drs. Nicholas Brodie and David Schriemer)

Rejeanne Taylor Research Prize

Aly Abdelkareem (Dr. Sorana Morrissey)
Amit Kalra (Dr. Faisal Khan)

2020 Charbonneau Institute Director's Award

Julia Daun (Dr. Nicole Culos-Reed)

2020 Daniel Family Foundation Graduate Scholarship

Michaela Patton (Dr. Fiona Schulte)

2020 Howard Research Excellence Awards

Elizabeth Barretto (Dr. Savraj Grewal)
Saranya Navaneethakrishnan (Dr. Ki-Young Lee)
Dustin Pearson (Dr. Aaron Goodarzi)
Brooke Russell (Dr. Fiona Schulte & Dr. Lianne Tomfohr-Madsen)
Kurt Hildebrand (Dr. Michael Monument)
Michaela Patton (Dr. Fiona Schulte)

Women and Children's Health Research Institute Support Program

Dr. Christa Aubrey (Dr. Sophia Pin)

DEAR Fund on the Impact of COVID-19

Christina Ince and Christa Aubrey (Gynecologic Oncology Program)

Members of the Division of Radiation Oncology Recognized Nationally for Academic Leadership

Canadian Association of Radiation Oncology (CARO) Gold Medal Awarded to Dr. Lisa Barbera

Dr. Lisa Barbera, Professor and Head of the Division of Radiation Oncology at the Tom Baker Cancer Centre, was awarded the Canadian Association of Radiation Oncology (CARO) Gold Medal for 2020 and delivered the annual Dr. Gordon Richards Lecture at the 2020 CARO Virtual Scientific Meeting. The CARO Gold Medal is awarded to an exceptional Canadian Radiation Oncologist who exemplifies highest standards in the professionalism, clinical care, scholarship, and leadership domains.

Dr. Shawn Loewen Recognized for Leadership in Health and Human Resources Planning and Oncology Workforce Matters

As the number of cancer cases diagnosed each year continues to climb, understanding Alberta's needs to care for cancer patients can help ensure that highly qualified providers and specialized infrastructure are in place to sustainably meet the rising health care demands. Dr. Shaun Loewen, a radiation oncologist at the Tom Baker Cancer Centre and Clinical Associate Professor with the University of Calgary, was recognized for his expertise in health and human resources planning and oncology workforce matters. He also serves on a Specialty Workforce Committee for the Royal College of Physicians and Surgeons of Canada, the Model of Care Working Group with the Canadian Partnership Against Cancer, and chairs the Canadian Association of Radiation Oncology (CARO) Human Resources Committee. In 2019, Dr. Loewen was the recipient of the Department of Oncology Excellence in Research Award.

Division of Radiation Oncology Hosts Canada-Wide Exam Preparation

For the first time in its history, the Division of Radiation Oncology hosted the 25th Annual Canadian Exam Preparation and Review Course for Clinical and Radiation Oncology from November 25-30, 2020. This six-day annual refresher course, developed by Course Director Dr. Jeff Cao and Director of Exams Dr. Natalie Logie, was designed to assist Radiation Oncology residents from across the country in preparing for their Royal College examinations. The successful event showcased the expertise of the division members and featured a "Women Who Curie" event co-led by Division Head Dr. Lisa Barbera, CARO President Dr. Corinne Doll, and Associate Medical Lead for the New Calgary Cancer Centre Dr. Tien Phan.



Above: Dr. Lisa Barbera and Dr. Shaun Loewen, Division of Radiation Oncology



Above: Dr. Michael Roumeliotis

Photo: Avenue Calgary

**avenue
magazine CALGARY
TOP 40 UNDER 40**

**Dr. Michael Roumeliotis:
*Medical Physicist, Radiation
Therapy Innovator, and CEO***

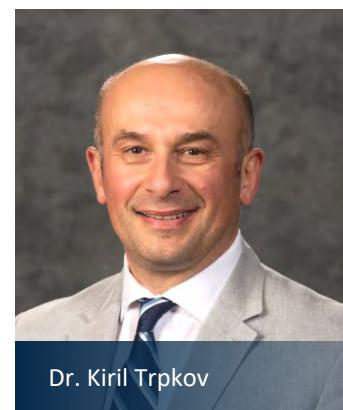
Dr. Roumeliotis is a Medical Physicist at the Tom Baker Cancer Centre, Adjunct Associate Professor in the Department of Oncology, CEO of Okolo Health, and one of Calgary's Avenue Magazine Top 40 Under 40 class of 2020. Dr. Roumeliotis was recognized in the Top 40 for his work in radiotherapy innovation that spans clinical, academic, and industry portfolios.

His work is focused on improving radiotherapy techniques that are used to treat cancer patients and translating these innovations to clinics across Canada and the rest of the world. Dr. Roumeliotis has fostered collaborations both within the province of Alberta, across Canada, and internationally. He has led the development of software and devices that allow institutions more accurately deliver radioactive seeds for brachytherapy. This initiative has already been piloted in Alberta, Ontario, and BC and is now poised to enter the US market.

Dr. Roumeliotis also has a partnership with researchers at the Robarts Research Institute at Western University aiming to advance brachytherapy image guidance for gynecologic and breast procedures. Incorporating this novel imaging will improve the quality of care received by patients undergoing treatment with brachytherapy and measurably improve the lives of those with cancer.

Calgary's Dr. Kiril Trpkov Elected Genitourinary Pathology Society President

Dr. Kiril Trpkov, Professor of Pathology at the University of Calgary, is the Genitourinary Pathology Leader for the Department of Pathology and Laboratory Medicine and a consultant for the Southern Alberta Institute of Urology and Tom Baker Cancer Center. He established the Anatomical Pathology Laboratory at the Rockyview General Hospital as one of the largest uropathology centres in Canada and North America. He is a member of several national and international expert panels and committees that establish clinical practice guidelines in genitourinary (prostate, bladder, kidney, testes, etc.) pathology. Dr. Trpkov has given lectures, courses, work shops, and seminars in genitourinary pathology on all continents and helped found the international Genitourinary Pathology Society (GUPS), which has over 500 members from over 40 countries. He was elected the first President of GUPS in 2019. In the last few years his research has particularly focused on recognizing and characterizing several novel kidney cancer entities to enable appropriate diagnosis and improved treatment.



Society President
(2019—current)

Founding Member
(2018—current)

Dr. Kiril Trpkov

REVENUE FROM GRANTS, DONATIONS, AND CLINICALTRIALS

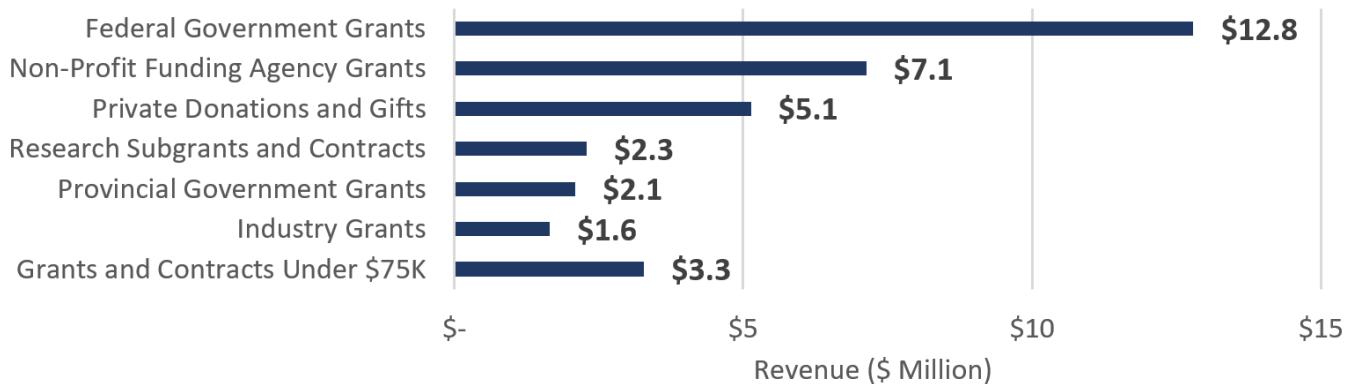
Annual Trend in Cancer Research Revenue



Annual Trend in Tri-Council Grant Revenue



2020 Cancer Research Revenue, by Source





Two-time Canadian Institutes of Health Research 2020 grant recipient, Dr. Donna Senger with Dr. Bo Young Ahn

Photo: Kelly Johnston, Cumming School of Medicine





INSTITUTE GIFTS AND FINANCIALS

Thank You to Our Generous Community of Donors

The Institute and its members were pledged over **\$22.8 million** in donations in 2020. Several new gifts from our generous community have supported research focused on:

- ◆ Cancer immunotherapy
- ◆ Cancers of the head and neck
- ◆ Metastatic renal cell (kidney) carcinoma
- ◆ Psychosocial oncology and survivorship in pediatric patients
- ◆ Novel therapeutics for glioblastoma (brain cancer)
- ◆ Childhood cancers and blood disorders
- ◆ Colon cancer and surgical oncology
- ◆ Lung cancer
- ◆ Several other areas of excellence

A statement of operations for the Institute is provided below.

Statement of Operations	2019-20 Actuals	2020-21 Budget
Revenue		
Charbonneau endowment / restricted gifts	\$1,465,904	\$1,582,267
Expenses		
Research	\$730,386	\$575,271
Education	\$79,962	\$50,746
Administration	\$492,769	\$565,241
Public Outreach and Communications	\$37,131	\$25,000
Carryover for future years	\$125,656	\$366,009

ACKNOWLEDGEMENTS

Charbonneau Strategic Advisory Board 2020



Ms. Gail O'Brien (Chair)

As a director of SickKids Foundation and chair of Children First Canada, Ms. Gail O'Brien has devoted herself to the not-for-profit sector focusing on children, medicine, and arts across Canada.



Mr. Keith MacPhail

Mr. MacPhail is a director of NuVista Energy Ltd. And previously served as a director of Bonavista Energy Corp. Mr. MacPhail was appointed as a Member of the Order of Canada in 2019.



Ms. Sharon Siebens

Ms. Siebens has been a volunteer and active philanthropist for many years. She has a longstanding association with the United Way of Calgary and at one time co-chaired the major donors committee.



Ms. Chanel Avarello

Ms. Avarello worked as a prosecutor until taking time away to spend with her daughter and twin boys. She is involved in charitable organizations in medicine and ones that address gendered violence.



Dr. Gerald Zamponi

Senior Associate Dean, Cumming School of Medicine
Dr. Zamponi's research focus has been on the roles of voltage gated calcium channels in controlling neurons.



Ms. Janelle Wakaruk

Executive Director Development, Cumming School of Medicine

Janelle has worked for over 14 years in communications and fund development.



Ms. Heather Culbert (on leave)

With over 27 years of experience in the oil and gas sector, Ms. Culbert has held many senior positions and formerly served as Senior Vice President, Corporate Services, at Enerplus, a mid-sized oil/gas company.



Mr. Tony Smith

Tony Smith is an engineer and graduate of the University of Calgary. The Smith Family has been a supporter of cancer research at the U of C since establishing the Smith Brain Tumour Centre in 2005.



Mr. Marvin Romanow

Mr. Romanow is a Corporate Director, Executive in Residence at the University of Saskatchewan, and past President and Chief Executive Officer of the oil and gas company, Nexen Inc.



Mr. Allan Ross

Mr. Ross is the Chairman of Report Back (a technology based solution for digitally challenged business owners) and past Chairman the quantitative hedge fund, Ross Smith Asset Management.



Dr. Don Morris

Medical Director, Tom Baker Cancer Centre, Alberta Health Services
Head and Professor, Department of Oncology, University of Calgary

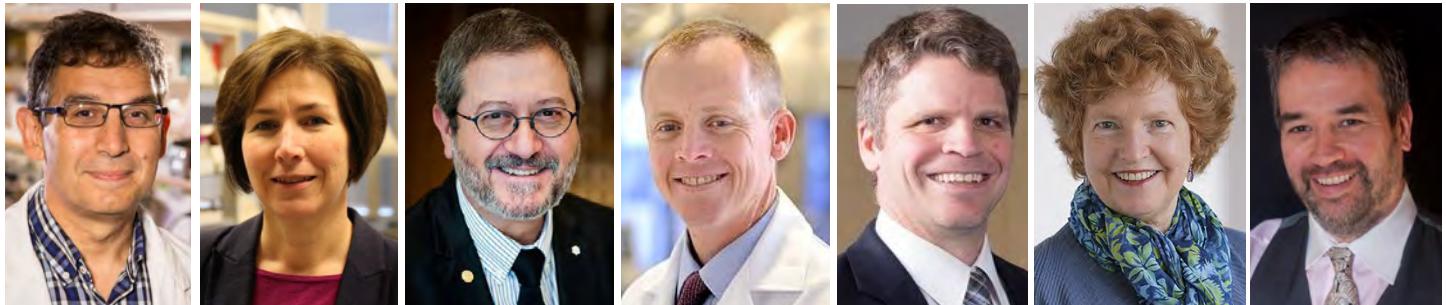




City of Calgary Peace Bridge

ACKNOWLEDGEMENTS

Charbonneau External Scientific Advisory Board 2020



Dr. Samuel
Aparicio

Dr. Cheryl
Arrowsmith

Dr. Eduardo
Franco

Dr. Donald
William Parsons

Dr. Geoff
Porter

Dr. Julia
Rowland

Mr. Patrick
Sullivan

Dr. Samuel Aparicio is the Nan & Lorraine Robertson Chair in Breast Cancer Research and Canada Research Chair in Molecular Oncology; Head, Department of Molecular Oncology, BC Cancer Agency; and Professor, Department of Pathology & Laboratory Medicine, University of British Columbia.

Dr. Cheryl Arrowsmith is a Senior Scientist, Princess Margaret Cancer Centre and Senior Scientist at the Ontario Cancer Institute; Chief Scientist, Structural Genomics Consortium – Toronto; and Professor, Department of Medical Biophysics, University of Toronto.

Dr. Eduardo Franco is the James McGill Professor in the Departments of Oncology and Epidemiology & Biostatistics; Director, Division of Cancer Epidemiology; and Chairman, Department of Oncology, Faculty of Medicine, McGill University.

Dr. Donald William Parsons is the Director of the Center for Personal Cancer Genomics and Therapeutics; and an Associate Professor in the Departments of Pediatrics-Oncology, Molecular and Human Genetics, and BCM Human Genome Sequencing Center, Baylor College of Medicine.

Dr. Geoff Porter is the Gibran and Jamile Ramia – QEII Health Sciences Centre Chair, Surgical Oncology; Research Professor, Departments of Surgery and Community Health & Epidemiology; and National Project Lead, Breast Cancer Synoptic Reporting, Canadian Partnership Against Cancer (CPAC)

Dr. Julia Rowland is a Senior Strategic Advisor, Smith Center for Healing and the Arts; (formerly) the Director of the Office of Cancer Survivorship, National Cancer Institute, National Institutes of Health; and Associate Professor and Director, Psycho-Oncology Research, Georgetown University.

Mr. Patrick Sullivan is the President and Director, Team Finn Foundation and a Founding Partner of Taylor Veinotte Sullivan.

Charbonneau Steering Committee 2020

Vice President, Research
University of Calgary

Dr. William Ghali

Senior Associate Dean,
Cumming School of Medicine

Dr. Gerald Zamponi

Vice President, Provincial Clinical
Excellence, Alberta Health Services

Dr. Kathryn Todd

Scientific Director,
Cancer Care Alberta

Dr. Paula Robson

Associate Calgary Zone Medical
Director, Alberta Health Services

Dr. Peter Jamieson

Facility Medical Director, Tom Baker
Cancer Centre, Alberta Health Services

Dr. Don Morris



Charbonneau Executive Committee 2020

Director:

Dr. Gregory Cairncross

Deputy Director:

Dr. Jennifer Chan

Research and Mentorship:

Dr. Savraj Grewal

Education and Microscopy:

Dr. Aaron Goodarzi

Infrastructure:

Dr. Douglas Mahoney

Precision Oncology Hub:

Dr. Paola Neri

Psychosocial Oncology:

Dr. Fiona Schulte

Cancer Epidemiology:

Dr. Darren Brenner

Charbonneau Trainee Association:

Mr. Jack Attewell

Business and Operations:

Ms. Donna Wray

Strategy and Partnerships:

Ms. Melissa Shea-Budgell

Communications and Events:

Ms. Carmen Coelho

We would also like to acknowledge the important contributions of our Executive Assistant, **Ms. Lisa Willms**.

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