

# Beatrice Hunter Cancer Research Institute Impact Report – 2019/2020

Evolving cancer research in Atlantic Canada



**Building a Cancer Research Community in Atlantic Canada**



BEATRICE HUNTER  
Cancer Research Institute

Evolving Cancer Research in Atlantic Canada

# A Message from BHCRI's Scientific Director



The mission of the Beatrice Hunter Cancer Research Institute (BHCRI) is to grow and nurture all types of cancer research within Atlantic Canada. Research supported by BHCRI contributes to knowledge critical to our understanding of cancer and is improving the well being of our Atlantic communities. What follows is a cross section of some examples of BHCRI researchers and their research. Like me, I hope that you are inspired by the talent and skill of our researchers. Allow me also to highlight some of the achievements of the past year.

April 4, 2019 marked the beginning of our 10-year anniversary and BHCRI has embarked on a series of [articles](#) highlighting some of the research and researchers who have been supported by BHCRI over the years and the impact of this research on cancer care.

Our largest and longest-standing program is the [Cancer Research Training Program](#) (CRTP) currently with 34 trainees, covering a broad range of cancer topics. Over the life of CRTP, **almost 200 trainees** have 'graduated' from the program and many now have independent cancer research programs of their own and, in turn, are training the next generation of CRTP trainees. We are working on a section of our website to highlight the accomplishments and careers of our CRTP alumni, which will be unveiled in the coming months.

The annual May workshop with the theme 'Where are They Now? Exploring Career Options from CRTP Alumni' saw the return of five former CRTP trainees who have pursued various careers. Each outlined their very different career trajectories and provided timely and thoughtful advice about planning for the future. To encourage greater engagement of trainees with those providing funding, many of our trainees have presented the impact of support for their training by meeting with the staff of our various funding partners.

BHCRI is fortunate to have many organizations invest in our programs to support cancer research in Atlantic Canada. I want to highlight our most recent partner, GIVETOLIVE, that hosts an annual fundraising event to support all areas of cancer research. GIVETOLIVE has dedicated this fundraising effort to BHCRI through the Dalhousie Medical Research Foundation, and we are building a strong partnership and relationship with this group. In 2021, their bike ride will take place in (the very hilly) Gaspé and we encourage anyone who is interested in joining this remarkable group [to do so](#).

I have only been able to scratch the surface of the events of the past year, but 2019/2020 has certainly not been without its challenges. The impact of Covid has resulted in the temporary closure of cancer research operations and labs, a dramatic decline in charitable donations and fund-raising events causing major loss of funding for our partners. BHCRI has responded by ensuring continuing financial support for our trainees and faculty with existing awards, moving to virtual review processes, workshops and meetings. We have cancelled some events such as public lectures and an external review of the Institute, but BHCRI (like every other organization) is adapting to functioning remotely. We can count on the partnerships that we have with many generous and dedicated organizations. Their support is critical to advancing cancer research. In turn, these remarkable organizations can count on BHCRI to do everything within our power to work with and support our partners.

On a personal note, I am incredibly proud and honored to be the BHCRI Scientific Director, and to see first-hand both the dedication of our members and the resourcefulness of our talented staff (Carla Ross and Shannon Donovan). Together with partners who invest in BHCRI, we will continue to advance knowledge critical to control cancer. Despite the challenges of the past few months, strong and passionate people with a willingness to collaborate, and a clear vision for the future for cancer research will undoubtedly bring us through to create an even stronger community.

A handwritten signature in black ink, appearing to read 'Gerry Johnston'.

Dr. Gerry Johnston, Scientific Director

# BHCRI members: advancing cancer care, policy and treatment

## Peptide based nano-carriers for Drug Resistant Breast Cancer Treatment



Research underway in Dr. Marya Ahmed's lab at the University of Prince Edward Island, focuses on the development of peptide-based nanocarriers for precise and targeted delivery of multiple drugs into cancer cells. The treatment of breast tumours with more than one chemotherapeutic is considered an effective method to reduce the side effects of single drug treatments, but poor solubility of cancer drugs in blood and different rates of clearance of two drugs from blood are major issues with this therapy. Because of this, there is a need to develop new and better therapies, which reduce the side effects of existing drugs and improve tumour regression in cancer patients. The use of combination drugs to overcome aggressive, metastatic and resistant cancerous anomalies is a focus of leading cancer research today. The cocktail of chemotherapeutics generally involves simultaneous intake of multiple anticancer drugs by the patient with little or no-control on their how the relative doses of these drugs are determined or how much of these drugs are delivered to the affected area. *Dr. Ahmed has been a member of the BHCRI Training Committee since 2018 and part of BHCRI's Scientific Review Panel for Summer Studentships. Through her involvement with BHCRI, Dr. Ahmed has established fruitful collaborations with fellow BHCRI members.*



## When academia and industry collide

Dr. Kim Brewer (IWK Health Centre and Dalhousie University) and Dr. Marianne Stanford (IMV Inc in Dartmouth, NS) are working together to use molecular imaging to improve the clinical translation of immunotherapies. IMV is a clinical stage company, advancing several T cell-based immunotherapies. This includes DPX-Survivac which is in Phase 2 trials in several cancer indications, including ovarian cancer. With magnetic resonance imaging (MRI), it is possible to track both immune cells and novel therapies over long periods of time, which will allow researchers to better understand individual clinical responses to therapies. "When we use molecular imaging to study therapies such as IMV's DPX-Survivac, a unique peptide-based therapy that elicits strong immune responses and is being tested in clinical trials for ovarian cancer," says Dr. Brewer, "we can better interpret clinical results enabling improved delivery of therapies for patients." An example of iterative science, going from the bedside to the bench and back to the bedside, and the research is critical in the effective clinical translation of novel immunotherapies. *Dr. Brewer and Dr. Stanford have been members of BHCRI's Scientific Review Committee, lending their expertise to both the Summer Studentship and CRTTP panels. They received a BHCRI New Investigator award in 2016 which subsequently led to \$250,000 in other grant support.*



## You cannot know unless someone tells you: Immigrants share their perspectives of cancer screening



In New Brunswick, like all provinces in Atlantic Canada, cancer is the leading cause of death. Immigrant and refugee adults display limited use of cancer screening services and therefore are more likely to present with advanced cancer. These adults face challenges in cancer screening, yet we know little about their experiences. At the University of New Brunswick, Dr. David Busolo is examining immigrant and refugee adults' understanding of and their participation in cancer screening programs. Using interviews and focus group discussions, study findings will increase our knowledge of the reasons behind poor cancer screening practices for adult immigrants and refugees and find better ways of engaging them in cancer screening efforts. This study is part of a program of research on advancing cancer prevention for the immigrant and refugee population in New Brunswick, and Canada. In the future, Dr. Busolo will use the findings to develop and test effective cancer screening programs for this population. *Dr. Busolo is a member of BHCRI's Research Committee and recipient of a BHCRI New Investigator Award.*

## Spying on Cancer



Research in Dr. Sherri Christian's lab at Memorial University is focused on how cells communicate with each other. This is especially important in the context of cancer because cancer cells are very good at modifying their environment in ways that help them to grow. "One way that cancer cells communicate is by releasing small packages that contain a unique signature of proteins and genes.", says Dr. Christian. These packages are called extracellular vesicles. Cancer cells release thousands of extracellular vesicles that circulate throughout the body; no matter where the cancer cell itself is located. The function of these extracellular vesicles is often not known but the presence of extracellular vesicles carrying a cancer cell's unique signature could indicate if cancer cells are present, growing, or shrinking. Current work in Dr. Christian's lab on acute lymphoblastic leukemia (B-ALL), the most common cancer in children, is focused on understanding how extracellular vesicles can be used to monitor cancer. A deeper understanding of the function of extracellular vesicles could also reveal ways that cancer could be targeted. This precision medicine approach can potentially decrease the number of hospital visits and allow changes to treatment in real time so that the right drug is given at the right time. *Dr. Christian is past Chair of BHCRI's Training Committee. She has received operating grants from BHCRI and has had trainees funded through the Cancer Research Training Program. Dr. Christian herself, is a former CRTP trainee, now supervising the next generation of cancer researchers.*

*"It takes a village to raise a scientist, and my village was BHCRI members sharing all their expertise and encouragement." – CRTP Trainee Meg Dahn*



## The light at the end of the tunnel

Photodynamic therapy, a cancer treatment combining light energy with a drug, can be used to treat certain types of cancer. This is one of the research foci for Dr. Ken Hirasawa's lab at Memorial University. "If you apply light to cancer cells that have photosensitizer inside them, it will cause the photosensitizer to stimulate production of reactive oxygen species inside the cell", says Dr. Hirasawa. Reactive oxygen species can cause cancer cells to die. Although photodynamic therapy is non-invasive and effective, cancer cells often become resistant to the treatment, leading to recurrence of cancer. For Dr. Hirasawa, the goal is to try to stop this cancer resistance in patients treated with photodynamic therapy. *Dr. Hirasawa's trainees have been supported by the Cancer Research Training Program. Dr. Hirasawa has been a member of BHCRI's Scientific Review Committee for both the CRTP and Summer Studentship panels.*



## Understanding how our own cells can be taught to kill cancer

Dr. Andrew Makrigiannis, an immunologist in the Department of Microbiology and Immunology at Dalhousie University studies the immune system, specifically 'natural killer' (NK) cells. NK cells kill abnormal cells such as cancer cells and recently NK cells have been shown to possess 'immunological memory'. Thus, NK cells are good candidates to engineer long-term anti-cancer responses. Dr. Makrigiannis' research interests revolve around the regulation of natural killer (NK) cell function. "We mainly study the contribution of the Ly49 family of class I MHC receptors to the decision by the NK cell to kill or spare tumour or virally-infected cells", says Dr. Makrigiannis. The Makrigiannis Lab investigates how NK cells acquire long-term memory that then helps kill cancer cells over long periods of time. This research will advance our understanding of NK cell memory to adapt NK cells for cancer immunotherapy and provoke long-term immunity against cancer, an essential step in developing cancer vaccines. *Dr. Makrigiannis' current PhD student is supported by the Cancer Research Training Program.*

*An estimated 225,800 new cancer cases and 83,300 cancer deaths are expected in Canada in 2020.*



## Researching new cancer treatments

Dr. Tony Reiman is a medical oncologist at the Saint John Regional Hospital, a Professor at Dalhousie Medicine New Brunswick and the Canadian Cancer Society Research Chair at the University of New Brunswick. Dr. Reiman's research involves his patients and focuses on how to identify the right cancer drug for the right patient at the right time. This precision medicine approach allows clinicians like Dr. Reiman to better target treatments for each individual patient. His laboratory team is developing tests that can be conducted on tumour tissue or blood from cancer patients that will help to direct therapeutic decision making, while testing new potential therapies in the laboratory setting that could potentially be brought to the clinic for further testing. Together with colleagues in Saint John, across the country and around the world, Dr. Reiman conducts clinical trials of promising new cancer therapies. His work focuses on multiple myeloma, lung cancer and lymphoma. *Dr. Reiman is a member of BHCRI's Management Advisory Council. His students have received funding through the Cancer Research Training Program and the BHCRI Summer Studentship program.*



## Understanding the biology of cancer

Université de Moncton's Dr. Gilles Robichaud, wants to figure out how a tumour's environment provides cancer cells with the resources and signals they need to survive and grow. "Our cancer research program focuses on the molecular and cellular signaling networks which dictate cancer malignant behaviour and, lead to disease progression", says Dr. Robichaud. The tumour micro-environment nourishes cancer cells with external sources of bioactive material and building blocks to benefit cancer processes. Dr. Robichaud and his team are studying the mechanisms of cancer cell outsourcing of pro-cancer components in order to block and deprive cancers of vital resources for disease progression. Dr. Robichaud's research program also study non-coding RNAs and functional genomics to elucidate how mutation and specific genetic signatures promote cancer disease. Recently, Dr. Robichaud and his team have elucidated the regulation of oncogenes by non-coding RNAs (i.e. micro and circular RNAs) in B-lymphoid cancer lesions and breast cancer. This research will increase the understanding of cancer biology in order to strategically develop more effective diagnostic tools and therapies against this disease. *Dr. Robichaud is a past member of BHCRI's Training Committee and has received numerous BHCRI grants. Additionally, several of his trainees have received funding through the Cancer Research Training Program.*

*Based on data from 2012 to 2014, 63% of Canadians diagnosed with cancer are expected to survive for 5 years or more after a cancer diagnosis. Between 1992 and 1994, the survival rate was 55%*

## Creating better outcomes for cancer patients



Memorial University's Dr. Sevtap Savas, is passionate about improving the survival outcomes of cancer patients. Currently, the major focus for her lab is aimed at identifying the biomarkers that can predict patient outcomes, such as recurrence, in colorectal cancer. They are also interested in whether patient risks can be predicted in the long-term, that is after the most commonly used 5 years' follow-up time. This kind of study has the potential to help identify those patients who are at increased risk of these clinic events over time. This information then may help patients get appropriate care in the clinic. Dr. Savas says, "We are interested in understanding the social needs and experiences of cancer patients." For example, Dr. Savas and her team would like to know whether cancer patients in Newfoundland and Labrador are stereotyped or discriminated because of their disease and what kind of social support needs they may have. Such studies can help open public conversations, advocate for cancer-affected individuals, and improve the social experiences and quality of life of the cancer patients. *Dr. Savas has received grant support from BHCRI and her current PhD student has been funded through the Cancer Research Training Program. Dr. Savas has served on numerous BHCRI Scientific Review Committees.*

## How research can improve patient care



Dr. Robin Urquhart's research program studies issues related to access to and quality of cancer care, and how the care we deliver impacts patients' and families' experiences and outcomes. While she examines what happens across the entire spectrum of cancer care, from primary prevention to end-of-life care, she has a particular interest in understanding people's experiences and outcomes after they complete cancer treatment, and designing and testing interventions to improve their experiences and outcomes. Simply put, she studies what we do, what happens as a result of what we do, and how we can do things better. Dr. Robin Urquhart's research program interfaces directly with the Nova Scotia Health Authority's Cancer Care Program, where she has informed real-world practice related to both post-treatment follow-up care as well as goals of care for patients with advanced cancer. *Dr. Urquhart is a member of both the Management Advisory Council and Research Committee. She has received multiple grants from BHCRI and has had trainees funded through the Cancer Research Training Program.*

*The 5-year net survival rate is high for prostate cancer (93%) and breast cancer (88%).*

## *Feature Profile –*

### *Dr. Derrick Lee- Math, Stats and Computer Science*

#### **Nature vs Nurture: The interplay of genetics and environmental exposure in cancer**

Originally from St. John's Newfoundland, BHCRI Associate Member Dr. Derrick Lee, has found a home at St. Francis Xavier University in Antigonish, Nova Scotia and is BHCRI's first member at that institution.

Statistics (and math) play an important role in cancer research – from testing the efficacy of a drug, to identifying novel biomarkers, and understanding if the results are applicable to the general population. For Dr. Lee, studying biostatistics allows him to combine his knack for numbers (Dr. Lee has a PhD in Epidemiology & Biostatistics from the University of British Columbia) and desire to understand colorectal cancer, one of the most prevalent cancers in Atlantic Canada. Colorectal cancer hits particularly close to home for Dr. Lee, as Newfoundland & Labrador (and Atlantic Canada) is disproportionately affected by colorectal cancer compared to the rest of Canada. “Losing family and friends to cancer definitely influenced several decisions during my time as an undergraduate and graduate student.”, says Dr. Lee.



Dr. Lee's primary research focuses on identifying environmental and genetic risk factors for cancer and the interactions between genetic mutations and environmental exposures. “The goal of my research is to explain and identify how environmental and genetic factors contribute to high colorectal cancer rates in Atlantic Canada”, says Dr. Lee, “Investigating the unique factors that contribute to the alarming rate of colorectal cancer in Atlantic Canada can help us better understand this disease and reduce its overall impact on Canadians.” Many Atlantic Canadians share a similar heritage, as many residents can trace their ancestry to the first European settlers. Couple this with the fact that family history is a risk factor for colorectal cancer and that Atlantic Canada has some of the highest rates of smoking, the focus of Dr. Lee's research is on identifying an inheritable set of mutations unique to Atlantic Canadians, particularly in genes that influence the carcinogenic effects of smoking. By identifying gene mutations associated with colorectal cancer, especially ones unique to Atlantic Canada, ***“not only can we better explain the high rates of colorectal cancer within the region, but with these new biomarkers, we can identify those at greater risk and encourage them to participate in regular screening programs, which can help us catch the disease in its early stages and potentially save lives.”*** *Dr. Lee joined BHCRI in June 2019 and is the recipient of a BHCRI New Investigator Award.*



# Why fund research?

The past few years have seen amazing new therapies introduced into clinical care of cancer. Moreover, new technologies provide health-care professionals with unprecedented capacity to both identify those individuals at risk of developing cancer and to assess response to therapy. The complexity of cancer and sophistication of the technologies required to study cancer mean that researchers are increasingly dependent on collaborative approaches that bring together investigators with a range of expertise, with access to cutting-edge research facilities. These innovations, that are rapidly and positively impacting cancer control and treatment, are made possible only through significant research funding.

## BHCRI by the numbers:

### Investments

In 2019/2020, BHCRI supported **43** cancer research programs, with over **\$900,000** in regional financial support.

#### Investigator Awards

(Faculty researchers)

**Total Investment: \$357,649**

#### Cancer Research Training Program

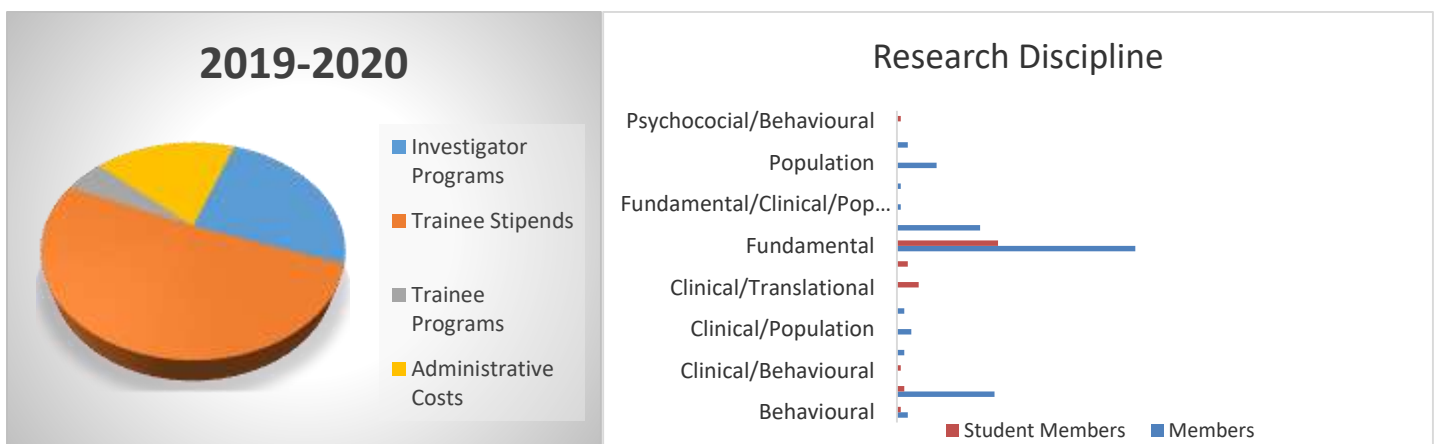
(Supporting Graduate students and postdoctoral fellows)

**Total Investment: \$533,959**

#### Summer Studentships

(Undergraduate students)

**Total Investment: \$25,500**



Thank you to our partners. Together, we are doing great things.



To learn more about cancer research underway in Atlantic Canada, contact us at:

902-494-4513 / [admin@bhcri.ca](mailto:admin@bhcri.ca)

Or visit our website: <https://bhcri.ca/>