

THE

Dalhousie Medical Research Foundation Magazine Fall 2017

PHILANTHROPIST



A TEAM OF DALHOUSIE UNDERGRADUATE STUDENTS are bringing their cutting-edge research in synthetic biology to the International Genetically Engineered Machine (iGEM) competition in Boston this November.

READ DUNCAN'S COURAGEOUS STORY and how it relates to this year's Molly Appeal Campaign!



DMRF MESSAGE

OFFICERS

Mr. Allan Shaw

Chair, Halifax

Ms. Janet MacMillan

Vice Chair, Halifax

Mr. Brian Thompson

CEO, Halifax

DIRECTORS

Mr. Taleb Abidali

Halifax

Dr. David Anderson

Ex-Officio, Halifax

Mr. Jim Cruickshank

Halifax

Ms. Sarah Dennis

Halifax

Mr. Glen Dexter

Halifax

Mr. Michael Durland

Halifax

Mr. Peter Fardy

Ex-Officio, Halifax

Dr. Richard Florizone

Ex-Officio, Halifax

Mr. Malcolm Fraser

Halifax

Ms. Lynn Irving

New Brunswick

Mr. Charles MacQuarrie

Truro

Dr. Roger McLeod

Ex-Officio, Halifax

Mrs. Barbara Oland

Halifax

Ms. Kaitlyn Sobey

Halifax

Dr. John Steeves

Ex-Officio, Halifax

CONTENTS

Message from CEO & Chair 3

Viroceuticals Research 4

Cover Story 6

PROFYLE 8

Molly Researchers 10

Molly Patient Story 12

Molly Patient Story 13

FORBOW 14

Parkinson's Disease 16

Youth Health 18

Message from the Deans 20

Supporting Molly 21

Leave a Legacy 22

We've Moved 23

EDITOR

Christena Copeland

CONTRIBUTORS

Jill MacCannell

Melanie Jollymore

Christena Copeland

PHOTOGRAPHY

Chris Geworsky

John Sherlock

Daniel Abriel

Nick Pearce

DESIGN

Barbara Raymont

Advocate Communications Group

5743 University Avenue, Suite 98

PO Box 15000

Halifax, NS B3H 4R2

Publications Mail Agreement No. 40010676

Return undeliverable Canadian address to:

Dalhousie Medical Research Foundation

Dalhousie's Faculty of Medicine is a comprehensive research enterprise focused on building current areas of excellence with a view to the future of health care. Dalhousie Medical Research Foundation (DMRF) exists to bolster this vision by supporting the exceptional work taking place at the Faculty of Medicine. We succeed by connecting donors with research projects of significance to their lives. The health issues that impact you, are our call to action.

We believe in medical research that is innovative and collaborative, influencing health care and economic growth. Dalhousie attracts some of the best researchers in the world and their work is providing solutions to public health issues that affect each and every one of us - locally, nationally, and internationally.

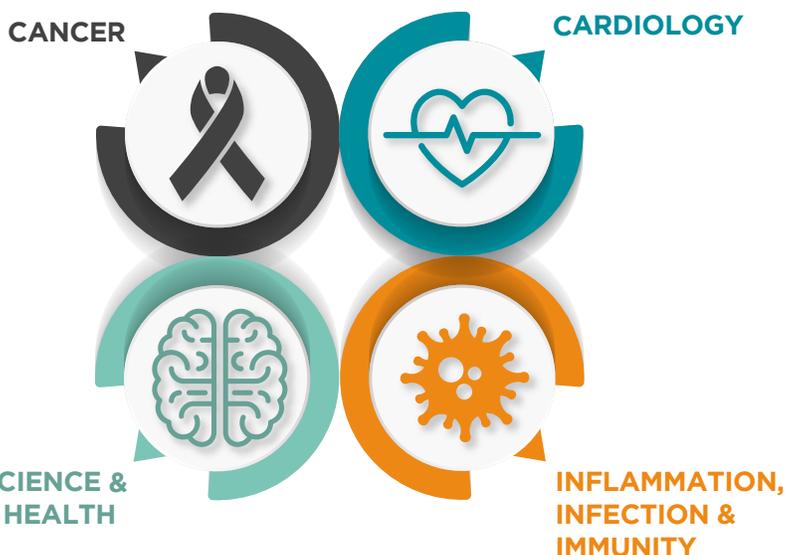
While preventing illness and improving healthcare is key, increasing economic development and bringing dollars and jobs to Atlantic Canada is a fundamental aspect of the research projects DMRF funds. Medical research generates a powerful economic footprint by creating jobs and promising business opportunities, while training the people and attracting the investment to build a thriving knowledge economy in the Maritimes.

This issue of *The Philanthropist* focuses on innovation and how our researchers seek novel approaches to advance their findings. Our researchers share knowledge across disciplines. They focus on precision medicine that's customized to suit an individual's unique genetic makeup. The outcome isn't always about a cure, but also about improving quality of life, which impacts the patient, their family, friends, colleagues and the community as a whole. To ensure the future of health care and to stimulate the local economy, our researchers actively invest in student researchers, training the next generation of medical researchers. Our researchers are our greatest capital.

Within these pages, you will witness the incredible work of our researchers and the projects that are advancing health care as we know it. We also highlight this year's Molly Appeal Campaign that is focused on cancer research and an exceptional project that concentrates on collaboration and personalized medicine. We hope you enjoy what you read and thank you for supporting medical research at Dalhousie. 🏠

SOME OF OUR MAJOR RESEARCH PRIORITIES

Dalhousie Medical School is focusing its research resources and talent on the most pressing health concerns in the Maritimes - while building on existing strengths in four key areas:





Brian Thompson, DMRF CEO

**CEO
MESSAGE**

The year I have spent as CEO of DMRF has been a testament to the decision I made to join a team dedicated to supporting leading medical research. In fact, my first year reaffirmed my belief that the Maritimes is a global leader in medical research and health care delivery. Our researchers seek to improve and innovate how they conduct their work. Dalhousie's dedicated and outstanding talent reaches across disciplines and geographic boundaries to find the best health outcomes for people like you and me.

To ensure the future of health care and to stimulate the local economy, DMRF actively invests in research initiatives that involve student researchers. Our students inspire us to stretch further and we eagerly watch these young minds work collaboratively on projects that aim to boost health care delivery and the economy.

Our vision is to support work that not only bolsters the health and wellness of individuals, but that also builds a thriving economy in our region. Being part of this exciting process is a privilege.

As our research initiatives grow in scope and size, so do the demands of our Foundation; we are happy to rise to the occasion. Our donors are savvy, educated, and engaged. More than ever, we are connecting DMRF donors to projects that are innovative, dynamic, and cutting-edge. Everything we do - our breakthroughs and achievements - is a direct outcome of the contributions of donors.

As a reflection of this growth, the DMRF team has expanded and we are pleased to announce that on September 13th, we moved into a new office space, located at 5743 University Avenue, Suite 98, on the corner of Cathedral Lane, just a couple of blocks from the medical school. We hope you'll stop by and visit our new home.

I thank you, our loyal donors and supporters of local medical research. Please enjoy this issue of *The Philanthropist*.

Sincerely,

Brian Thompson



Allan Shaw, DMRF Board Chair

**CHAIR
MESSAGE**

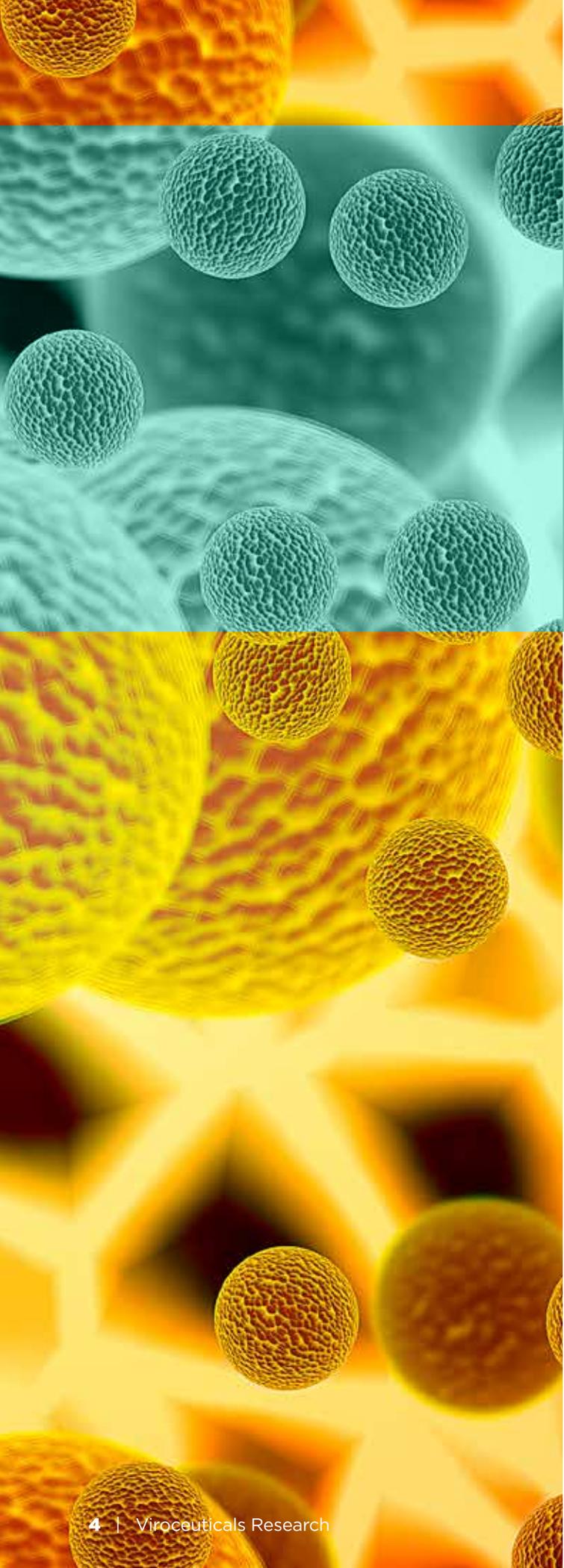
As a local businessman and proud Maritimer, I am impressed with the year I have spent as Chair of DMRF. I've seen significant development in both the medical research projects at Dalhousie's Faculty of Medicine as well as how we at DMRF support these projects. Today, medical research is focusing not just on better treatments and potential cures, but on prevention and how to offer a better quality of life for patients. At DMRF, we know that being able to live well is an essential aspect of health care. We invest in outcomes. We invest in people.

I want to take this opportunity to send special thanks to the DMRF team for all their hard work and especially to CEO Brian Thompson for his exceptional leadership, dedication, and unwavering enthusiasm. Brian, in your first year you have demonstrated your commitment to this Foundation as well as to the Maritimes. I look forward to working with you and your team to make DMRF a vehicle in which to advance medical research not only in this region, but across the country and beyond.

To you, our donors, my sincere thanks for your continued support. Your generosity sustains us and allows our researchers to dedicate their time and talent to the work that is improving health care and delivery for everyone.

Sincerely,

Allan Shaw



Global leadership in **viroceuticals** research

As an internationally-acclaimed research centre for infection, immunity and vaccine research, Dalhousie, along with the IWK Health Centre and the Nova Scotia Health Authority, is quickly becoming a world leader in the discovery, development and testing of new vaccines, antiviral drugs and other life-saving viral therapies. These virus-based therapies are collectively referred to as “viroceuticals.”

For years, Dalhousie has been building capacity in this research area. Dalhousie researchers have broken new ground in understanding fundamental aspects of infection and immunity, and even how benign viruses and other microbes influence human health.

“We are now in a great position to capitalize on these discoveries,” says Dr. Craig McCormick of Dalhousie’s Department of Microbiology & Immunology. “We can use what we’ve learned about virus anatomy and how viruses are thwarted by healthy immune systems to make ‘smarter’ antiviral drugs and vaccines.”

Another really exciting aspect of viroceutical research is the repurposing of benign viruses to fight cancer. Continued investment and collaborative efforts will cement Dalhousie’s position as a world leader in viroceutical research, and help combat emerging threats

Our outstanding team of **world-class researchers**



DR. ROY DUNCAN

Research Team Leader and Professor
Department of Microbiology and Immunology
Killam Chair in Virology



DR. CRAIG MCCORMICK

Research Team Leader and Professor
Department of Microbiology and Immunology
Recipient of a CIHR New Investigator Award in Viral Oncology



DR. JEAN MARSHALL

Research Team Leader and Professor
Department of Microbiology and Immunology
Arthur B. McDonald Chair in Immunology



DR. SCOTT HALPERIN

Professor, Department of Pediatrics and Microbiology & Immunology, Dalhousie University
Director, Canadian Cancer Center for Vaccinology

to global health like influenza pandemics, Zika and dengue, and chronic diseases like cancer.

Indeed, Dalhousie researchers have led the discovery and development of a variety of cancer-fighting viruses. Termed “oncolytic viruses”, these viruses can be used to selectively kill cancer cells and teach the immune system to mount an anti-cancer assault. The recent licensing of the first oncolytic virus for the treatment of advanced melanoma has added an entirely new method of cancer treatment to the global toolbox, beyond existing treatment options such as chemotherapy and radiation, and have spurred greater investment in cancer-fighting virus technology.

In other recent viroceutical research, Dalhousie’s Dr. Robert Anderson, in collaboration with the National Cheng Kung University in Taiwan, has been actively working towards developing an effective vaccine for dengue virus and has recently demonstrated promising results in pre-clinical trials. This collaborative research could provide us with an effective vaccine for a viral infection that affects as many as 400 million people per year around the world, reducing catastrophic illness, suffering and death from dengue in the foreseeable future.

“Part of our strength here at Dalhousie is our collegiality and strong network of expertise, which we consistently leverage to expand opportunities and drive innovation,” says Dr. McCormick. “The first effective Ebola vaccine, for example, was recently brought to first-in-human clinical trials in collaboration with one of Canada’s leading vaccine centres in Halifax. Through this collaboration, we’re repeatedly able to evaluate the safety and efficacy of a range of vaccines, antivirals, and cancer-fighting viruses, making Nova Scotia a viable hub for both fundamental research at Dalhousie through to clinical trials and testing at the Canadian Center for Vaccinology.”

In addition to generating a significant business opportunity for the health and biotechnology sectors in Atlantic Canada, Dalhousie’s viroceutical research can help us to eradicate life-threatening illness, diminish chronic disease, shorten treatment times and decrease the physical, emotional and economic burden that such illnesses can impose.

With DMRF’s support, we can help cement Dalhousie and its partners as a hub for world-class research in this area, and more importantly, provide pivotal solutions to public health threats that impact the people of this region and around the globe. 🏠

Dalhousie students leverage medical research for **renewable energy**

COVER STORY



DMRF is thrilled to support the International Genetically Engineered Machine (iGEM) team at Dalhousie, as part of a unique initiative that provides rich research experiences to undergraduate students in the area of synthetic biology. Presenting unique opportunities for students, like being able to collaborate across disciplines and publish research in scientific journals, iGEM delivers exceptional applied learning to undergraduate students, with major international implications. As the only iGEM team in Atlantic Canada, Dalhousie's iGEM team is actively creating a hub of synthetic biology expertise in the region with their current project, and will soon present their research to a global audience at the largest synthetic biology conference in the world.

Using cutting-edge methods developed by Dalhousie medical researchers, Dalhousie's iGEM team is working to identify microbial genes that can breakdown plant-cellulose for biofuel production. A massive leap forward from traditional fossil fuels, cellulose-derived biofuel is currently a hot topic as a sustainable source of energy worldwide, however, existing methods of breaking down cellulose for biofuel require substantial resources like heat, water and harsh chemicals. Borrowing from Dalhousie's exceptional medical research expertise in microbiology and advanced understanding of the human microbiome, Mackenzie Thornbury and her team of fellow students are exploring the possibility of using the porcupine gut



Dal's iGEM Team (LR): Emma Finlayson-Trick, Bess Pearson, Mackenzie Thornbury, Matthew Curry, Jacob Sicheri, Molly Marcott, & Patrick Slaine. Missing: Landon Getz, Jamie Cook, Jacob Nearing, Nicholas Boudreau, Angela Tsai, Caroline Guinard, Serena Drouillard, Bronwen Parry, Mariam El-Aghil, Abdullah Al-Khaledi, Francis Routledge, & David Mahoney

microbiome – the natural bacteria and fungi in the gut of the porcupine – to breakdown cellulose for fuel conversion. “The porcupine lives on tree bark, and in order to get nutrition, the microbes in the porcupine’s gut have to break down cellulose into sugars to use for energy,” says Thornbury. “Applying the same pioneering DNA sequencing and analytical methods that we use for our medical research in humans, we’ve identified and isolated microbial genes from the porcupine microbiome that show promising ability to be synthesized for cellulose breakdown.”

Taking this cutting-edge research to the world stage, Thornbury and her team of fellow students will compete against 300 international, interdisciplinary teams at the iGEM Giant Jamboree this November in Boston, Massachusetts. Here, Thornbury’s team will showcase their expertise in synthetic biology and microbiology, and will have the opportunity to connect with powerful potential sponsors to help drive the project forward, including heavy hitters like the FBI and Google.

“Our goal is to demonstrate the novel concept that we can make microbes do the work for us in converting cellulose into biofuel in a much more efficient, affordable and sustainable way,” says Thornbury. “If we can show this and secure the resources to further develop the project, we could ultimately set up a bioreactor system for biofuel production and market this technology around the world.”

Indeed, global industries that produce cellulose waste stand to gain significant financial benefits from the development of this trailblazing, green technology, in addition to meeting goals of reduced carbon footprints. In Canada, for example, cellulose waste from the pulp and paper industry could be used to create renewable biofuel, as could cellulose waste from the booming sugarcane industry in Brazil.

In addition to generating enormous entrepreneurial and economic potential, both nationally and internationally, this iGEM project also has the potential to translate to

breakthroughs in medical research through the discovery of microbes that may improve human health. In recent research at Dalhousie, for example, Dr. Johan Van Limbergen and his collaborators have demonstrated that the human microbiome plays a key role in whether young Crohn’s Disease patients will respond well to treatment, or whether they will relapse. There is evidence that one of the complex plant-derived carbohydrates linked to flare-ups of Crohn’s is a molecule called carboxymethylcellulose, and the iGEM team has shown that microbes from the porcupine gut have the genes required to break down carboxymethylcellulose into simple sugars. The project could therefore have the side benefit of identifying beneficial microbes that could help limit painful flare-ups in Crohn’s Disease patients, as one of many potential influences it could have on human health.

In order to get Thornbury’s team to the iGEM Giant Jamboree, where they can make their big break and subsequently continue the research and development of this novel technology, funding support is imperative. With many major expenses in the mix, including a steep registration fee of \$4,500 USD, in addition to travel, accommodation and research lab expenses back in Halifax, the project would not be possible without DMRF’s support.

With our help, we can contribute to a sustainable future with environmentally conscious biofuel production and waste reduction, generate significant economic opportunities for Atlantic Canada and further research that could have major implications for the improvement of human health. 🌱

The iGEM team is grateful for Dalhousie’s support in helping establish the team in 2015, and to the Dalhousie Industry Liaison and Innovation Office for their critical guidance with outreach and fundraising. The team would also like to acknowledge invaluable funding support from DMRF, Genome Atlantic and Halifax city councillor Wayne Mason, as well as in-kind support from Qiagen, BioRad and New England BioLabs (NEB). 🌱

PROFYLE: Improving Treatment for High-Risk Youth Cancers

As a nationally collaborative initiative, the Terry Fox Research Institute's PROFYLE program brings together Canada's leaders in pediatric, adolescent and young adult cancer research and care, with the goal of improving outcomes for young Canadians with high-risk cancers.

Providing a virtual platform for researchers and clinicians to profile the tumours of young patients, PROFYLE allows for better diagnosis and treatment of high-risk cancers across the country, so that patients can live longer, higher-quality lives.

"This is a first for Canada and a cutting-edge tool globally," says Dr. Conrad Fernandez, who represents both Dalhousie and the IWK Health Centre as part of the program. "By being able to genetically profile the tumours of patients, and have top experts across the country analyze the data and advise on treatment strategies, we can better understand these high-risk cancers and provide patients with the best possible outcomes. Many patients will not have success with existing drugs, but by gaining further insight into the genetics behind their specific cancer, we can enrol these patients in novel clinical trials, and even develop new drugs with curative potentials."

One of the major strengths of the PROFYLE program is its unprecedented commitment to provide equal access to better treatment for patients, regardless of where they live in Canada. A six-year-old cancer patient in Edmonton, for example, can have her tissue sample sent to Vancouver for genomic analysis, after which point an expert consulting team from across Canada can advise on the best treatment plan.

Playing unique roles in the innovative PROFYLE network, Dr. Conrad Fernandez and Dr. Jason Berman, both cross-appointed to Dalhousie, were selected for their leadership in pediatric oncology research, and their expertise in ethics and cancer modeling. As the

national lead of the Ethics Node for PROFYLE, Dr. Fernandez is working to ensure that critical frameworks and governance standards are developed and implemented, to support the program's activities.

"There are a number of important ethical issues involved with treating high-risk cancers," says Dr. Fernandez. "From explaining the implications of genetic findings to patients and their families, to introducing novel treatment therapies and their risks, we're working to ensure a high level of sensitivity in all aspects of this process."

Dr. Berman also plays a key role in the PROFYLE network as the national co-lead of its Model Systems Node. Drawing on expertise in his lab in Halifax, Dr. Berman models the various high-risk cancers in zebrafish, to gain a better understanding of their disease mechanisms and to search for novel treatment strategies.

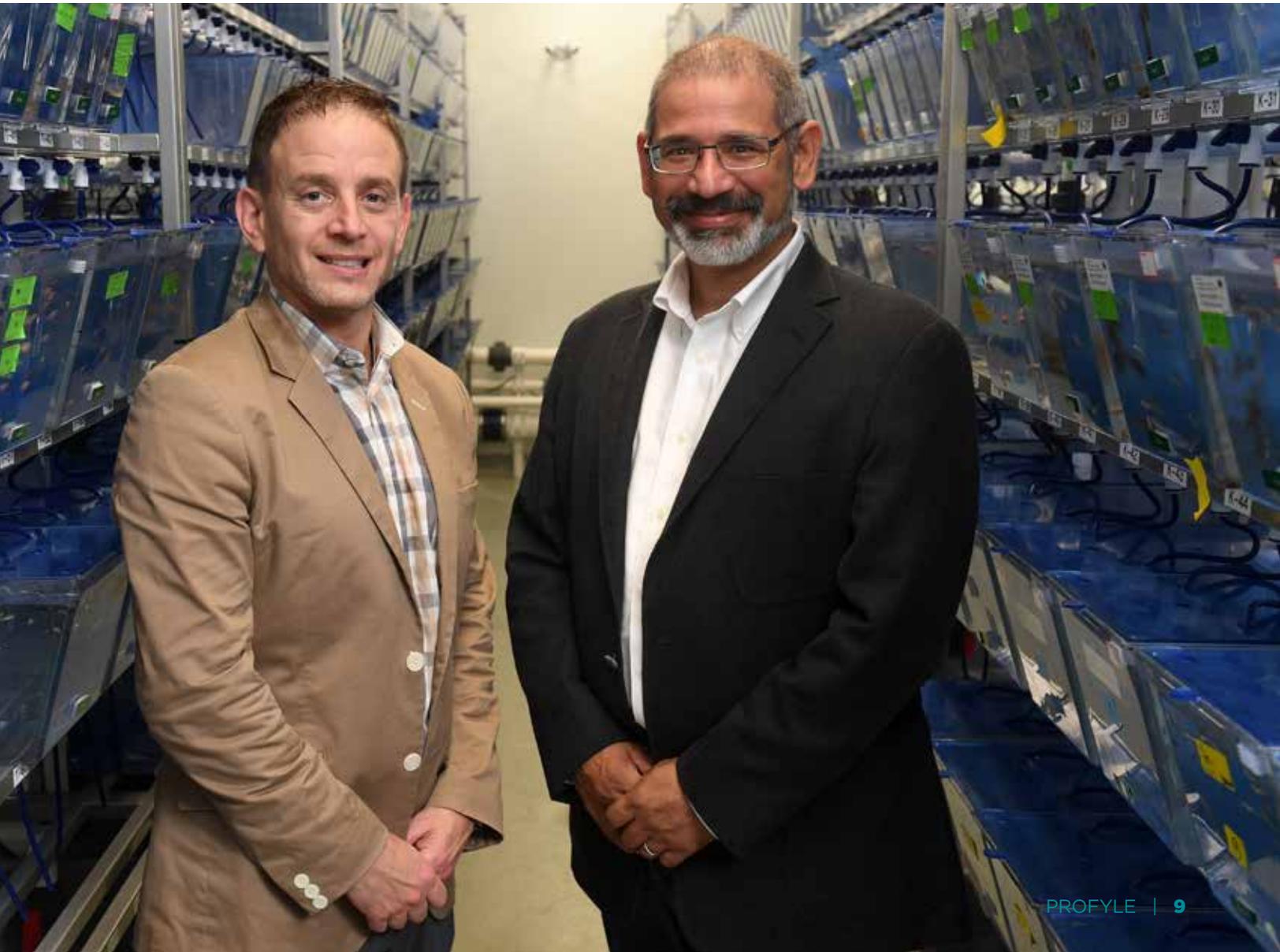
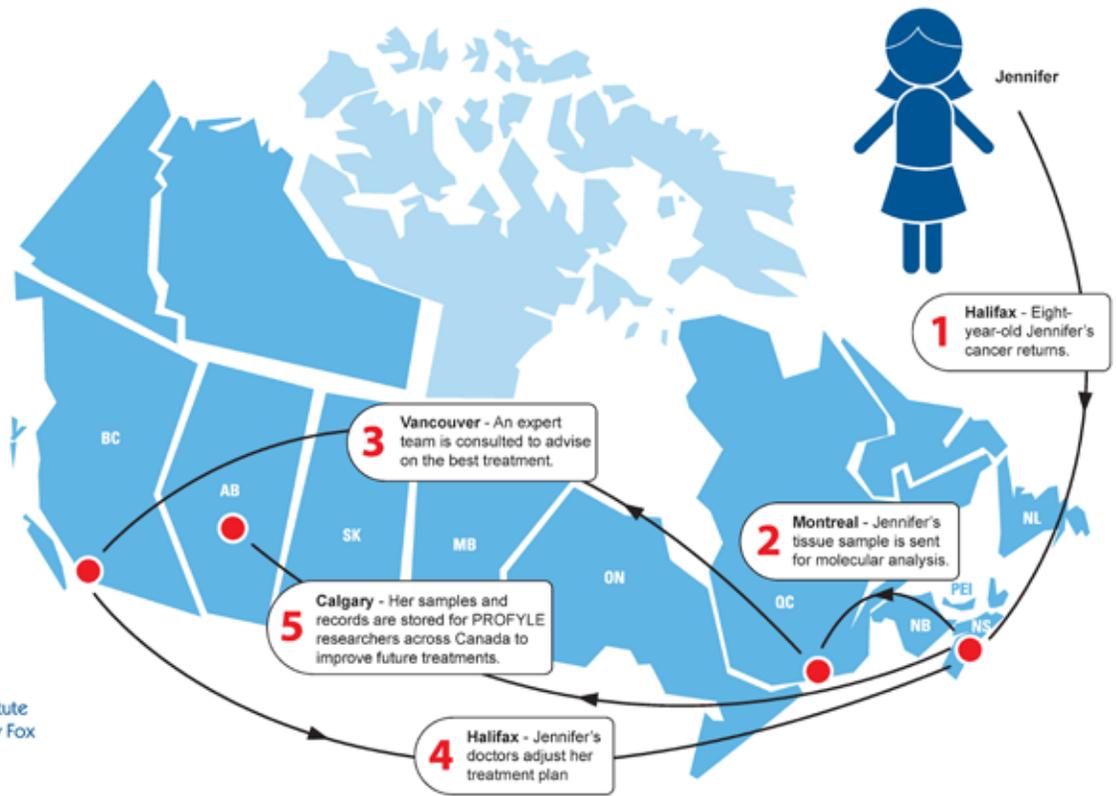
"The end goal of our work is to test the best potential drugs for treatment," says Dr. Berman. "By working together with the entire PROFYLE network, we can harness our collective expertise to ultimately match genetic cancer profiles with successful drug treatments."

Beyond providing young cancer patients with better treatment outcomes within Canada, the PROFYLE program also has powerful potential for international impact. Ultimately, the data generated from PROFYLE will be made available globally, for researchers, clinicians and patients to all benefit from. Information pertaining to the genetic sequencing of hard-to-treat cancers, as well as the successes and failures of different drug treatments, will inform medical decision-making and help improve the treatment of high-risk youth cancers, worldwide.

DMRF's valuable support can help drive PROFYLE forward, transforming it from the early stages of a cutting-edge national tool to a global database that helps young cancer patients live longer, fuller lives, all around the world. 🐟



Improving the outcomes of young people with cancer, one child at a time.



With the arrival of fall comes another important seasonal event – the launch of the Dalhousie Medical Research Foundation’s Molly Appeal for medical research. The Molly Appeal provides an opportunity for Maritimers to contribute to world-class medical research taking place right here in our community, at Dalhousie Medical School.

This year’s Molly Appeal is dedicated to cancer research.

Cancer touches everyone. According to the latest statistics, cancer claims the lives of nearly 80,000 people in Canada each year. Here in the Maritimes, we have the highest cancer rates in the country.

The good news is that cancer research is making a difference.

Scientists at Dalhousie Medical School are working diligently to create precision medicines that are targeted to the unique features of individual patients’ cancers. They’re learning how cancer differs from patient to patient, and even within a single tumour, requiring a fine-grained analysis of a broad swath of every patient’s cancer cells to identify the best treatment strategy.

Funds raised through this year’s Molly Appeal will be used to purchase the Fluidigm C1 System, for analyzing cancer patients’ cells, and to facilitate researchers’ access to banked tumour tissues from Maritime cancer patients. These capabilities, combined, will allow our researchers to understand more than ever about the mechanisms of cancer, how cancers vary from person to person, and how to design custom-treatments to effectively eradicate each person’s cancer. 🧪



Dr. Paola Marignani

Dr. Paola Marignani is on a mission to help identify and develop new cures for cancer, precisely targeted to the specific molecular profile of each individual patient’s cancer.

“Every cancer is as unique as the person who has it, based on their genetics and how their genes have been influenced by lifestyle factors and the environment,” explains Dr. Marignani. “We need to be able to analyze each patient’s cancer in great detail to predict which treatments will work best for this person’s particular cancer... the very essence of a precision medicine pipeline”.

Dr. Marignani has brought together more than 15 other researchers at Dalhousie Medical School to find molecular mechanisms that can be targeted to stop cancer and develop new ways of analyzing and characterizing patients’ cancers so they can be custom-treated.

The researchers will learn much more about how cancers differ from person to person with new equipment to be purchased through the 2017-18 Molly Appeal. Improved access to an expanded tumour tissue bank will further accelerate their efforts to effectively cure even lethal cancers.



Dr. Zhaolin Xu

Dalhousie pathologist and professor Dr. Zhaolin Xu is the driving force behind Canada’s largest and most comprehensive lung cancer tissue bank.

“We have amassed more than 900 lung cancer patients’ tissue samples and related health data in our tumour bank,” says Dr. Xu. “In addition to each patient’s tumour tissue, we have collected and analyzed samples of their healthy lung tissue, blood, plasma and DNA, and detailed clinical information about their medical history, cancer treatment and outcomes.”

This extensive information provides cancer researchers with insight into how different sub-types of cancer behave and respond to treatment. Patient tissue samples can also be used to create pre-clinical models of their cancers, which can be used for testing drugs to see which will work best for that particular cancer. “We’re moving into the realm of truly personalized medicine,” says Dr. Xu.

Some of the proceeds of the 2017-18 Molly Appeal will support a tumour bank manager, who will oversee expansion of the tumour bank to encompass more kinds of and facilitate researchers’ access to the resource.



Dr. Wenda Greer

As director of the DNA Diagnostic Laboratory at the Nova Scotia Healthy Authority (NSHA), Dr. Wenda Greer oversees the genetic and molecular analysis of cancer tissues from patients across the region.

“We analyze tissues from patients with known mutations that have treatments to match,” notes Dr. Greer, a professor in the Department of Pathology at Dalhousie Medical School. “These include sarcomas, melanoma, leukemia, lymphoma and breast, lung and colon cancers.”

When genes are mutated, they produce the wrong proteins. In the case of cancer, they produce proteins that provoke uncontrolled growth. Targeted therapies block these proteins, effectively stopping the cancer process.

“Equipment purchased through this year’s Molly Appeal will allow our researchers to analyze 800 cells at a time,” she says. “This will speed up the discovery of genetic mutations and other mechanisms that lead to cancer, and point the way to new targeted treatments.”



Dr. Drew Bethune

Thanks to new targeted therapies and advances in molecular testing that former thoracic surgeon Dr. Drew Bethune has helped bring to the Maritimes, the outlook for lung cancer patients has shifted from dismal to hopeful.

Dr. Bethune and his colleagues established the Atlantic Canada Molecular Oncology Centre (ACMOC) to identify genetic mutations, initially in the tumours of lung cancer patients.

“There are already approved therapies available for a number of these cancer-causing mutations, and therapies for several other mutations are coming along,” explains Dr. Bethune, now medical director of the Nova Scotia Cancer Care Program. “Because we have the facilities required to identify the mutations, we can provide patients with the precise medication that will work for their cancer.”

Proceeds of the 2017-18 Molly Appeal will provide cell-analysis equipment and support for tumour banking that will tie in with the ACMOC capabilities to allow Dalhousie cancer researchers to analyze patients’ cancers in greater detail and identify potential new targeted therapies.



Dr. Jeanette Boudreau

Immunologist Dr. Jeanette Boudreau is programming NK cells to selectively target and destroy cancerous cells.

“NK cells are complex, highly variable white blood cells that differ not only within a single individual but also from person to person,” notes Dr. Boudreau, an assistant professor in the departments of Microbiology & Immunology and Pathology.

Dr. Boudreau combines NK cells with patients’ cancer cells obtained from the tumour bank at the QEII to analyze the interactions between the killers and their targets.

“Cancer cells are just as heterogenous as NK cells, even within a single tumour,” Dr. Boudreau says. “Unique features of cancer cells and immune cells in a patient’s cancer can indicate what treatments are most likely to work best for them. Enhancements to the tumour bank and our cell-analysis technology funded by this year’s Molly Appeal will position us as leaders in personalized medicine for cancer.”



RIDING THE LEADING EDGE

Targeted **cancer** treatments arrive just in time for Nova Scotia man

Strange as it may seem, cancer saved Duncan Searle's life. In 2014, the then 64-year-old retired schoolteacher discovered in a routine screening that he had colon cancer. Thankfully, the disease was caught early and removed before it could spread.

Follow-up imaging studies, however, revealed a more deadly concern – the radiologist noticed shadows in Duncan's lung and sacrum. Further analysis showed that the cancer in his lung was completely separate from the now-cured colon cancer, and that the cancer in the sacrum had spread there from the primary tumour in the lung.

The news was a shock to Duncan, who had never smoked in his life. At the same time, he and his wife Leslie are immensely grateful the lung cancer was discovered when it was. "If it hadn't been for the colon cancer," notes Duncan, "it would have been too late to stop the lung cancer by the time it was found."

As it was, the lung cancer was already stage four, but timing would once again work in Duncan's favour.

"The pathologist in Halifax, Dr. Wenda Greer, analyzed my tumour and discovered I had a genetic mutation that a new targeted therapy had recently been approved to treat," Duncan says. "My oncologist, Dr. Mary MacNeil, started me on a pill, gefitinib, and the cancer started to disappear from my sacrum and my lungs."

Thanks to this personalized treatment, targeted to his specific mutation, Duncan regained his life. Even though the rashes, infections and skin lesions he experienced on gefitinib were uncomfortable, he and Leslie, a professional classical singer and voice teacher, went back to enjoying their active life in Toney River near Pictou, Nova Scotia. That is, until metastases showed up in Duncan's spine and brain. Radiation in 2016 knocked this cancer back, but he

still needed a solution for the fact that the gefitinib was losing its ability to keep the cancer at bay. But yet again, time was on his side.

"They analyzed and re-analyzed my biopsies and found a new mutation," he recalls. "Fortunately for me, there was another new targeted therapy coming available, osimertinib, just in time."

Dr. MacNeil contacted the pharmaceutical company, Astra Zeneca, to see if they could provide the medication to Duncan free of charge, on compassionate grounds. The company was willing and has been shipping a supply to Duncan like clockwork every month.

"It was such an enormous relief to find there was another new drug available – if I had been this sick even just six months earlier, it would have been too late," Duncan marvels. "As it was, I started feeling better within five days of starting the drug and have been feeling pretty good ever since!"

The importance of research hits home with Duncan and Leslie, who feel as if they've been driving along right behind the snowplow – the plow being the research that is clearing the way in the storm that is his cancer. They are enthusiastic about supporting Dalhousie Medical Research Foundation's 2017-18 Molly Appeal, which is raising funds to advance the kind of personalized medicine that has kept Duncan alive and well far beyond what his doctors had initially predicted.

"When Dr. MacNeil saw me in the spring of 2014, she said I could expect to live another three to six months," he says. "But then just a short while later, she called me to tell me about this new drug and said it was possible I could go on for years... well, I intend to! I'm grateful that we have this ground breaking research happening right here in the Maritimes at Dalhousie Medical School." 🏠



BEATING THE ODDS

New Brunswick woman **going strong** five years after advanced lung cancer treatment

PATIENT STORIES

The only words Heather Hogan could hear as she sat in the oncologist's office in Saint John in 2012 were, "You have a 15 per cent chance of surviving five years."

The rest of the doctor's words did not register for Heather – she had to rely on her husband and daughter to fill her in on the rest of the information the family received that day about her diagnosis and the treatment she would face.

Now, in 2017, the retired schoolteacher and former vice-principal of Meduxnekeag Consolidated School near Woodstock, NB, is going strong, with no evidence of disease.

"After my last appointment, my current oncologist said, 'Go live your life!', which is what I needed to hear," Heather recalls. "With lung cancer, they never say you're cured, but most recurrences happen within two years, so... so far, so good, but the possibility never leaves my mind."

Like so many non-smokers – or people who once smoked but quit more than 20 years – Heather's lung cancer was only discovered coincidentally. In Heather's case, the cancer showed itself when she went for a CT scan to check out an unrelated issue. The supposed abdominal problem turned out to be nothing – what did turn up on the scan was a shadow at the base of the right lobe of her lung.

"At first, the doctors thought it was just a scar from pneumonia. It was too small to biopsy through conventional means – a core needle biopsy – so they adopted a 'wait and see' attitude," Heather says. "It was still not a worry one year later when I had a follow-up PET scan, but the year after that, we were shocked to discover it had grown."

By this time, unfortunately, Heather's lung cancer had not only grown but spread to the nearby lymph nodes. "We

discovered after two surgeries that, instead of stage 1, I was stage 3a, just like that," she says. "We were aghast."

Heather started her first round of chemotherapy on New Year's Eve 2012. It took till the end of March to complete four rounds, as the chemo drugs caused her white blood cell counts to plummet. After chemo, she had 25 radiation treatments. The treatments worked – there has been no evidence of disease in any follow-up scan since.

While Heather is ecstatic to be doing so well, she is not content to simply rest now that she's retired. Instead, she had thrown herself into advocacy efforts to raise awareness, remove stigma, and improve lung cancer treatment.

"For years, lung cancer has been in the shadows, with a huge stigma attached to it," she says. "There's an attitude that people have done this to themselves, by smoking, but we all know people who've smoked heavily their whole lives and never got lung cancer. This is not an illness that anyone deserves, no matter what their lifestyle. The latest statistics from Lung Cancer Canada show that a growing number of lung cancer diagnoses these days are in people who don't smoke – just under half of them, in fact – and that many of these are in young women who have never smoked."

Heather is thrilled to support this year's Molly Appeal, which will provide Dalhousie cancer researchers with better access to patients' lung cancer tissues and with sophisticated cell analysis equipment. "It's exciting to see the genetic and molecular research that's going on here in the Maritimes," she says. "It's my hope that a blood test can be developed to screen for lung cancer as a routine annual thing – most people die from lung cancer because it was detected too late, often because that person didn't fit the criteria of the 'typical lung cancer patient.' This needs to change." 



Children) and SWELL (*Skills for Wellness*). While both the COACH and SWELL programs utilize Cognitive Behavioural Therapy (CBT) to help individuals develop mental health skills, the former focuses on teaching parents to coach their young children to develop in a healthy way, where the latter works with older children and adolescents directly.

“If you have a parent with an anxiety disorder and their child has a shy or inhibited temperament, there’s a very high likelihood they will develop an anxiety disorder themselves - well over 50 per cent,” says Dr. Pavlova. “Understanding that the development of mental illness depends on both genes and environment, we believe we can limit the passing on of mental illness by training parents to be careful of the behaviours they exhibit, thereby removing the environmental influences that interact with genetic vulnerabilities.”

The latest research suggests that anxiety is passed down mainly through environmental factors. The skills parents can equip their children with are of crucial importance to help shy children avoid growing up into anxious adults.

Working with anxious parents to provide them with coping strategies, as well as how to use those strategies in parenting their children, the goal of COACH is to ultimately help adults parent their children in an “anti-anxiety way”. In this highly personalized program, the FORBOW team meets with parents to first assess their anxieties, and then works with them for up to 16 one-on-one sessions to help them manage their anxiety through CBT techniques.

Dr. Pavlova says. “Through our work, we help people with anxiety discover that while their fears seem very likely to happen in their minds, in reality they are unlikely to happen and/or the consequences are much less than they expect.”

Catered specifically to each individual, interventions vary depending on the different forms, manifestations, and triggers of anxiety. Combining interactive interventions with

“These are also some of the most expensive, chronic illnesses to treat, and early intervention could benefit everyone, from individuals and families to taxpayers and society.”

independent homework and behavioural exercises, the final stage of the COACH program is to teach parents to apply the strategies they learn when it comes to parenting their children. With up to 8 one-on-one sessions dedicated to translating the program’s strategies to parenting methods, the hope is that parents can learn to parent their children in a way that makes it less likely they too will develop an anxiety disorder.

Similar to the COACH program for adults, the SWELL program seeks to help children and adolescents, aged 9-21, learn skills and strategies that don’t just help them solve their

current difficulties, but also prevent depression, bipolar disorder and other forms of mental illness. Gathering initial information from young participants through interactive activities, games, and discussions, the SWELL program follows a progression of one-on-one assessments and interventions. Using CBT techniques in a skills coaching context, the SWELL program aims to train healthy behavioural and thought patterns in young participants, to ultimately stop the development of severe mental illness.

COACH and SWELL are just the beginning. FORBOW researchers are also preparing novel interventions that may positively alter brain maturation at key developmental periods. Dr. Uher and his colleagues are deploying an innovative combination of molecular genetics and brain imaging to target such interventions to the individuals who are most likely to benefit.

The intent of the FORBOW project is to track families and young participants from the SWELL and COACH programs over 10-15 years and determine if early intervention can indeed prevent mental illness. In order to do this, however, significant sustained funding is required. Given that typical grant funding only covers short-term studies, the FORBOW project depends on the support of organizations like DMRF to carry out more meaningful, long-term research.

“We firmly believe that the earlier we intervene, the bigger difference we can make, but this needs to be proven over time,” says Dr. Uher. “If we want to minimize mental illness and increase the health and happiness of our society, the continuation of this study is essential.” 🏠

A novel treatment for Parkinson's disease



PhD Candidate, Katherine Strynatka



Dr. Christopher McMaster

INNOVATIVE DRUG TARGET

Parkinson's disease is the second most common neurodegenerative disorder, affecting approximately 100,000 Canadians and 10 million people worldwide. Though the symptoms of Parkinson's are easily identifiable, including tremors, rigidity, slowness of movement, behavioural issues and dementia, the cause of the disease remains generally unknown. Despite the fact that many treatment options exist for patients living with Parkinson's, all of these treatments merely mask the symptoms, rather than treating the underlying disease.

In response to a critical need for better treatment for a disease that devastates millions of lives worldwide, Dr. Christopher McMaster and his team at Dalhousie Medical School are paving the way for the development of a novel drug that will halt the progression of the disease for the first time, stopping it in its tracks. Drawing on the wealth of knowledge and expertise at Dalhousie University in genetics, Dr. McMaster's team is breaking new ground, testing innovative methods of treating Parkinson's right at the source – in the brain.

"Our research in genetics and genomics here at Dalhousie is world-leading," says Dr. McMaster. "By leveraging our strengths in this area and assembling interdisciplinary research teams to maximize our outcomes, we expect our new treatment for Parkinson's patients to prevent the progression of this destructive disease."

While the majority of cases of Parkinson's disease are idiopathic, meaning they have no clear cause, genetic forms of the disease account for approximately 10% of all cases and are better understood by the medical community. It has been found that the genetic forms of Parkinson's can be traced back to the hyperactivity of a gene called LRRK2, and that approximately 30% of all idiopathic Parkinson's cases share this underlying phenomenon. Dr. McMaster's research therefore focuses on a therapy that inhibits LRRK2 activity, to treat both the genetic forms of Parkinson's disease as well as an additional 30% of idiopathic cases.

"We've tested approximately 100,000 novel molecules with



Katherine Strynatka

PhD Candidate

Department of Biochemistry
and Molecular Biology,
Dalhousie University

A transplanted Torontonian, Katherine first came to Dalhousie University in 2007 and obtained a Bachelor of Arts in French before pursuing a Bachelor of Science in Biochemistry and Molecular Biology. She completed an Honour's project in the lab of Dr. Chris McMaster, where she gained valuable experience in designing models of genetic diseases and studying pathways in the cell. Under the guidance of Dr. McMaster, she is now working on her PhD in Biochemistry. Her thesis project focuses on discovering new drugs to treat genetic forms of Parkinson's disease. In addition to developing new therapeutics, Katherine's work will contribute to understanding how cellular processes are perturbed in those with Parkinson's disease. Katherine has presented her work locally and at international conferences but she especially enjoys sharing her passion for her research with non-scientific audiences. Science outreach is a priority for her and she welcomes opportunities to meet with the Parkinson's community and answer any questions about her work and other advances in the field of Parkinson's research.

our unique genetic approach, and we've found six of these compounds to be effective in preventing LRRK2 toxicity," says Katherine Strynatka, PhD candidate at Dalhousie University. "Our next step is to quickly move this class of drug compounds to trials in animal models, after which they can be moved toward first-in-human trials. Our goal, in the end, is to be able to introduce a revolutionary new drug for the treatment of Parkinson's."

The next phases of this cutting-edge research will take place all around the world, wherein Strynatka, McMaster and their team will be working with the best of the best in order to further test and develop this novel treatment. Collaborating with top partners like the National Institutes of Health and Merck Research Laboratories, the team has strategically matched their research expertise with the most prestigious global resources to provide a new and improved treatment to patients as quickly as possible.

"We know that when experts collaborate with experts, unrestricted by geographical borders, we can produce the best result," says Dr. McMaster. "This advanced level of specialization and international collaboration, however, requires substantial capital, which is why we need to do everything we can to secure funding for this important pursuit."

With support from DMRF and its donors, Dr. McMaster and his team can accelerate the development of a novel drug for Parkinson's that will finally address the underlying causes of the disease, rather than merely masking its symptoms. In addition to being able to halt the progression of a tragic disease that devastates millions of lives around the world, the successful development of this drug will generate a powerful opportunity for the Canadian economy and will reinforce Dalhousie's reputation as a world-leader in genetics research. 🌱

Changing the culture of youth health in Nova Scotia



Dr. Sara Kirk presents her work in Recipe for Health and Learning.

YOUTH HEALTH

Poor eating habits, sedentary behaviour and lack of sleep are key risk factors among children and youth that can impair learning and lead to the development of chronic diseases that can last a lifetime. Stemming from a critical need to address poor youth health across Nova Scotia, with increased rates of conditions such as obesity, diabetes and heart disease, Dalhousie researchers are working to implement a new Recipe for Health and Learning across the province with the R4HL project.

To create a healthier Nova Scotia, the R4HL project will work collaboratively with stakeholders across the province to affect change in school policies, families and communities. Students, teachers and parents will all play a key role in the R4HL process, as will important stakeholders from the health and education sectors including the Nova Scotia Health Authority, Department of Education and Early Childhood Development (DEECD), the Department of Health and Wellness (DHW) and the IWK Health Centre.

“The current reality we are facing in Nova Scotia is one where our children are going to spend the rest of their lives with a great deal of ill health if we don’t do something to turn

things around,” says Dr. Sara Kirk, project co-lead and Scientific Director of Dalhousie’s Healthy Populations Institute. “Our goal is to change the trajectory of health for children in this province, to promote better learning in school and allow these youth to reach their full potential as healthy, productive members of society.”

Indeed, poor health among youth in Nova Scotia currently contributes to a host of chronic conditions like obesity, diabetes, heart disease, cancer, joint problems, sleep apnea, depression and anxiety. One in three children in Nova Scotia now experience issues with excess weight and obesity, an astonishing 200% increase over the last two decades.

Provincial research has also shown that inadequate diet, physical inactivity and sedentary behaviour in childhood are independently associated with the development of internalizing disorders, such as anxiety and depression. Indeed, mental health challenges are on the rise in Canada, and recent data demonstrates that around 26% of primary-aged children are deemed vulnerable.

With these trends, and with health care costs in Nova Scotia currently accounting for approximately

50% of all public spending, the transformation that R4HL hopes to deliver is crucial not only for the health, happiness and productivity of the next generation, but also for taxpayers across the province.

“To put it bluntly, we cannot continue to fix people when they’ve become broken. We have to prevent them from becoming broken in the first place,” says Dr. Kirk. “Money invested into health promotion in schools elsewhere has already demonstrated an ROI of \$13 for every dollar invested. We feel we can take this even further with the R4HL project and really change the trajectory for our youth in this province.”

Taking a broad-systems approach, the R4HL project will combat cultural aspects of our schools and communities that currently undermine health in Nova Scotia. Practices like fundraising with unhealthy foods, or limiting opportunities for children to engage in regular physical activity, will be replaced with efforts to help schools model what it means to be healthy and active for life. Crucially, the project will engage children and youth as key change-makers in their schools and communities.

“We know that when children are nourished and active, they learn better, perform better and behave better,” says Dr. Camille Hancock Friesen of Dalhousie’s Faculty of Medicine, Dr. Kirk’s co-lead on the project. “Understanding that schools represent a critical setting where lifelong healthy habits can be formed, R4HL will focus heavily in the school setting, and will emphasize student involvement as an integral part of the process.”

By engaging and empowering youth as change-makers, R4HL will support the development of leadership and mentoring skills among youth to create sustainable change in health. Student-led initiatives like edible school gardens, play-based learning activities and peer mentoring will all represent important components of the program.

Drawing on existing models such as the Health Promoting Schools (HPS) initiative, being led in Nova Scotia by the DEECD, Nova Scotia Health Authority and DHW and endorsed internationally by the World Health Organization, R4HL will build on proven success to create sustainable change in schools and communities across the province.

Recognizing the project’s importance, the Public Health Agency of Canada is looking to commit up to \$5 million over five years for R4HL if matched private sector funding is secured. As such, a powerful consortium has been formed among the province’s leading health care centres and medical research organizations, with the QEII Foundation, IWK Foundation and DMRF joining forces to raise critical private funds. With our support, R4HL can become possible, as can a healthier future for Nova Scotians.

“Our children deserve to live healthy lives, and to be unburdened by chronic disease for as long as possible,” says Dr. Kirk. “Not only that, they deserve to have the opportunities to achieve their full potential, in their lives and careers, and be part of a brighter future for this province.” 🌱





Dean Brenda Merritt (Acting)



Dean David Anderson

In the name of innovation in research and health care, we checked in with Dalhousie's Dean of Medicine and Acting Dean of Health to find out how we're doing.

It's no surprise where Dalhousie's priorities and strengths lie, with each Faculty emphasizing collaboration as the key avenue to advancing research and care moving forward.

"If we can change the way we work together within the Nova Scotia health care ecosystem, working towards seamless collaboration across not only different health disciplines, but also our various institutions, we can dramatically expedite our health discoveries and improve our delivery of care," says Dr. Brenda Merritt, Acting Dean, Faculty of Health.

With a conviction that we're better together, both the Faculty of Health and the Faculty of Medicine are leading the way for system advancement, leveraging Dalhousie's strong network of expertise, internally and externally, to expand opportunities and drive innovation.

"Within Dalhousie, our goal is to ensure that we work well together across our respective faculties. Research is more meaningful and successful when there is a collaborative approach to our studies," says Dr. David Anderson, Dean, Faculty of Medicine. "Even further, we need to work together with our provincial health authorities, departments of health, government and other partner universities to foster innovation and improve the health of the people of this region."

In part with Dalhousie's leading efforts, health professionals working in silos will soon be a thing of the past. Health care students are being trained together to prepare them for the teamwork required in their professions.

"What we ultimately want to see is more inter-professional care at a primary level," says Dr. Merritt. "Say you go to your family physician for back pain. You then have to get a referral to see a specialist, and it could take weeks before you're able to get in to see one. What about having a specialist available on the spot to begin with, as part of a collaborative evaluation team?"

Indeed, a future with increased collaboration between disciplines, and inter-professional teams working together at a primary level, can deliver more effective, timely care, and prevent further injury or illness. This inter-professional approach will also have the important benefit of saving the system money in the long run, addressing health issues upfront and head on, before they become chronic.

"There's a tremendous amount of money being spent on health care delivery currently, and we know this is not sustainable. What we need to do is come together to provide the best solutions to health problems in a more effective manner, leveraging the many different resources that we have," says Dr. Anderson.

Over the past few years, collaborative research and care have been at the forefront in Nova Scotia, with Dalhousie as a key player in this transformation. "The organization of health care delivery in Nova Scotia has recently been simplified from nine health authorities to two, namely the IWK Health Centre and the Nova Scotia Health Authority," says Dr. Anderson. "This reorganization has facilitated new opportunities for collaboration in planning and research, and has already improved the delivery of care through a streamlining of the system. Dalhousie plays an integral part through training and research and through collaboration with our partners in the health authorities. Many of the key leaders, clinicians and scientists in the provincial health authorities are also Dalhousie faculty."

If Dalhousie can continue to pursue important collaborative work, we can change health care as we know it. Contributions from DMRF are imperative in supporting this innovative work, so we can achieve timely access to affordable, effective care in Atlantic Canada, from young to old. 🏡



**Cutting edge
research has
given Duncan
back his
edge.**

100% of proceeds raised through the Molly Appeal will enhance a collaborative **cancer research** program led by Dr. Paola Marignani. Your gifts will support the purchase of a Fluidigm C1 System – a machine that can find the best cancer treatment “fit” for each individual patient. It’s a medical breakthrough that will improve health outcomes for people living with cancer, like Duncan.

For ways to give, and to view Duncan’s story go to mollyappeal.ca.



5743 UNIVERSITY AVENUE • SUITE #98 • PO BOX 15000 • HALIFAX, NOVA SCOTIA B3H 4R2



WHERE BREAKTHROUGHS BEGIN

Please make your cheque or money order payable to:
Dalhousie Medical Research Foundation

5743 UNIVERSITY AVENUE • SUITE #98
PO BOX 15000 • HALIFAX, NOVA SCOTIA B3H 4R2

I prefer to use my: VISA MC AMEX

Card Number: _____

Expiry Date: _____ CVV2: _____

SIGNATURE : _____

I do not wish to have my name appear in the DMRF annual report or have my gift publicly acknowledged in any donor recognition program.



I support cancer research with my gift of:

\$35 \$50 \$75 \$150 Other \$ _____

Name: _____

Street: _____

Town: _____ Province _____

Postal code: _____ Phone #: _____

E-mail: _____

Registered Charity BN# 11922 9318 RR0001

Please give today: 1.888.866.6559

mollyappeal.ca



LEAVING A LEGACY

Launching in October 2017, the Dalhousie Medical Research Foundation Legacy Society will formally recognize individuals who graciously include the Foundation in their wills and estate plans.

Presenting these generous individuals with an identifiable lapel pin at DMRF events, the Foundation will honour the incredible commitment these donors have shown toward medical research, by becoming members of the new society.

“Many donors have the kind, thoughtful foresight to leave donations and continue to help support medical research beyond their time on this earth,” says Ann Vessey, DMRF’s Director of Planned Giving. “The Legacy Society will allow us the opportunity to thank these extraordinary donors in advance for their contributions.”

DMRF’s very own Board Chair Allan Shaw just so happens to be one of these donors, along with his wife Leslie.

“It’s people like our donors and wonderful board members that help move medical research forward, to improve the health of Maritimers, Canadians and populations around the world,” says Shaw. “This has always been an important cause to us, and we want to make sure that even after we’re gone, we’re helping to foster innovation and progress in this regard.”

Donors who have included the Foundation in their wills are encouraged to notify DMRF, so they can be recognized as part of the Legacy Society as well.

“If you have decided to will a gift to the Foundation, we would love to hear from you so we can show you our deepest appreciation, from the bottom of our hearts,” says Vessey. “Your support is, and will continue to be, imperative in moving medical research forward.”

For more information, please contact: Ann Vessey | ann.vessey@dal.ca | 902-494-6565

YES! I believe in life-changing medical research!

PHIL FALL 2017

PLEASE:

- Call me to discuss creating a legacy gift to Dalhousie Medical Research Foundation
My phone # is: _____
- I have already remembered Dalhousie Medical Research Foundation in my Will
 - Please call me to discuss my wishes. *My phone # is: _____*
 - Please do not call me – I have all the information I need.
- Please forward sample wording to remember the Dalhousie Medical Research Foundation in my Will.
- I do not wish to be contacted about gifts in my Will
- I do not wish to have my name appear in the DMRF annual report or have my gift publicly acknowledged in any donor recognition program.

If you would like to speak to Ann Vessey directly regarding Dalhousie Medical Research Foundation, contact:

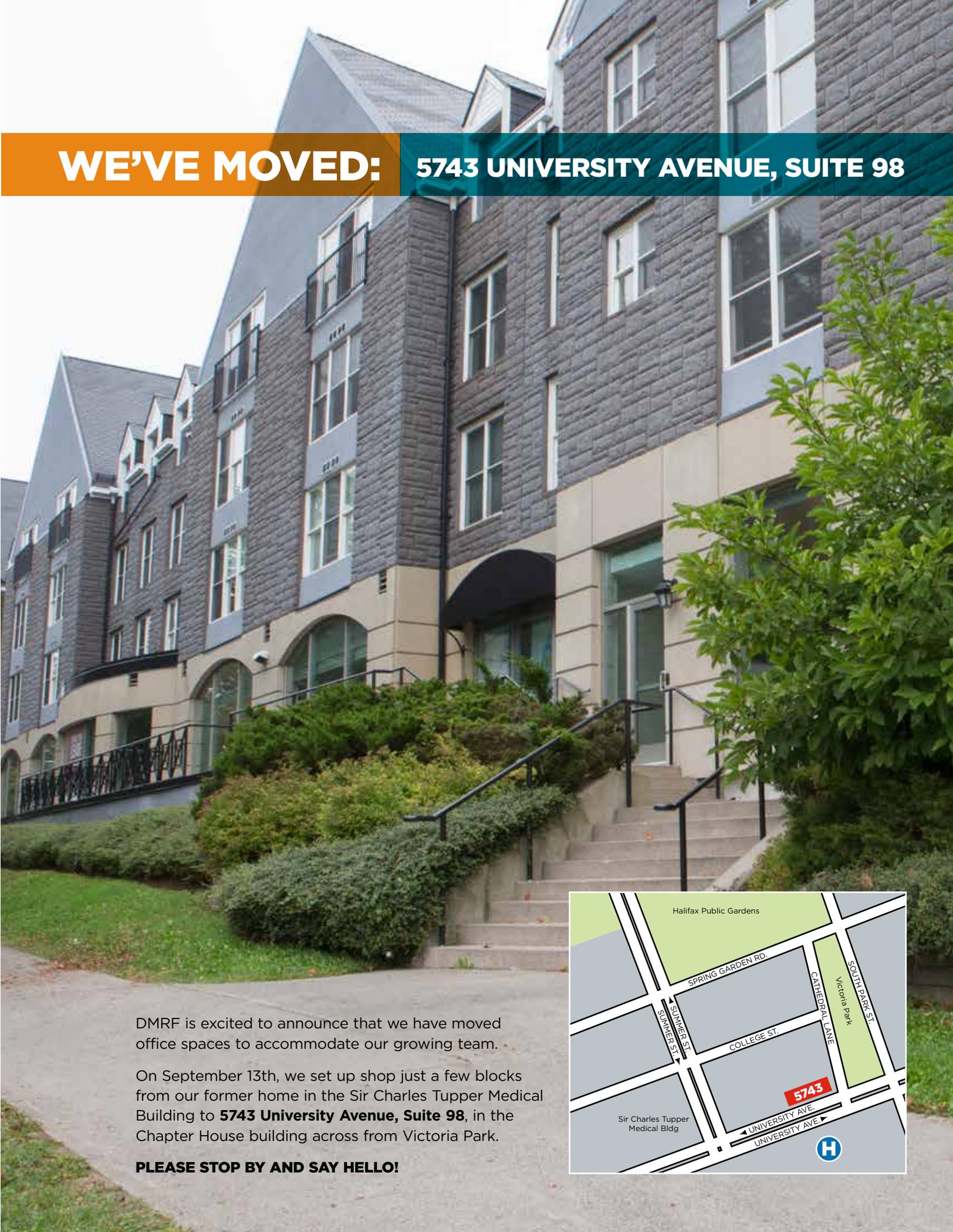
Tel: 902-494-6565 **Email:** ann.vessey@dal.ca
5743 University Avenue, Suite 98 PO Box 15000 Halifax, NS B3H 4R2

Web: www.dmrp.ca



WE'VE MOVED:

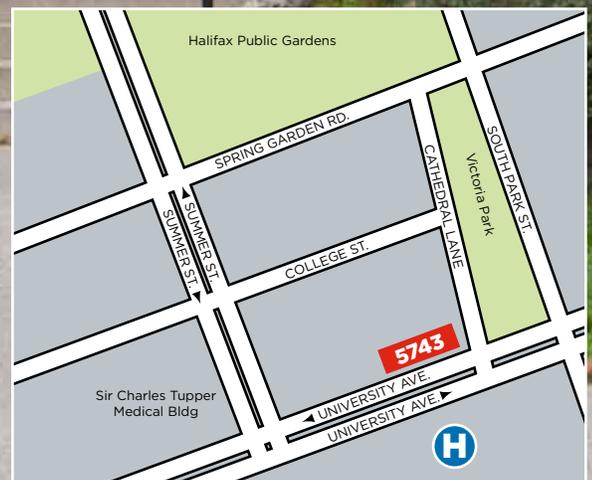
5743 UNIVERSITY AVENUE, SUITE 98



DMRF is excited to announce that we have moved office spaces to accommodate our growing team.

On September 13th, we set up shop just a few blocks from our former home in the Sir Charles Tupper Medical Building to **5743 University Avenue, Suite 98**, in the Chapter House building across from Victoria Park.

PLEASE STOP BY AND SAY HELLO!





DMRF BREAKTHROUGH BREAKFAST

eggs with a side of hope

On Wednesday, November 15, 2017, at the Cunard Centre, Dalhousie Medical Research Foundation invites you to join us for our **Breakthrough Breakfast: Eggs With a Side of Hope**. This year, renowned doctor and researcher Dr. Rudolf Uher will lead an exciting panel discussion about his pioneering work focused on youth and families, which is revolutionizing mental health treatment and care around the globe.

We are especially proud to recognize a family that has deep business and philanthropic roots in our region. The 2017 Breakthrough Breakfast will honour the Lindsays and their transformational contribution to the field of mental health research.

Let's get together in celebration of research, philanthropy, and the impact DMRF is having on Halifax, the Maritimes and beyond. Break eggs and bread with researchers, philanthropists, and those impacted by the great work of Dalhousie Medical Research Foundation. Don't miss out on the most important meal of the year!

To purchase tickets, please visit www.dmrf.ca, call **1-888-866-6559** toll-free or email dmrf@dal.ca.

Sponsored By:



DMRF.ca

Dalhousie
MEDICAL RESEARCH
Foundation 

5743 University Avenue, Suite 98, PO Box 15000, Halifax, NS B3H 4R2
e-mail dmrf@dal.ca website www.dmrf.ca telephone (902) 494-3502 toll-free 1-888-866-6559

Dalhousie
MEDICAL RESEARCH
Foundation 

Dalhousie Medical Research Foundation is an independently registered charity established for the purpose of providing financial support for research activities in the Faculty of Medicine at Dalhousie University and its affiliated research institutions.