

THE

Dalhousie Medical Research Foundation Magazine Fall 2018

PHILANTHROPIST

Read Baby Ella's courageous story and how it relates to this year's Molly Appeal Campaign!

Dalhousie researcher lands prestigious genetics role with CIHR.

DMRF is working in collaboration to change the landscape of health research in this region.



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. Michael Durland

Toronto

Mr. Peter Fardy

Ex-Officio, Halifax

Dr. Richard Florizone

Ex-Officio, Halifax

Mr. Malcolm Fraser

Halifax

Ms. Lynn Irving

Saint John

Ms. Peggy Leighton

Ex-Officio, Halifax

Mr. Charles MacQuarrie

Truro

Mr. Peter Mann

Toronto

Dr. Roger McLeod

Ex-Officio, Halifax

Mrs. Barbara Oland

Halifax

Mr. Joseph Ramia

Halifax

Ms. Kaitlyn Sobey

Halifax

ADVISORY COUNCIL

Mr. Glen Dexter

Halifax

Mr. David Matheson

Toronto

Mr. Rod MacLennan

Truro

Mr. Brian MacLeod

Antigonish

Mr. Charles Mitchell

Truro

Mr. Frank Sobey

New Glasgow

EDITOR

Christena Copeland

CONTRIBUTORS

Jill MacCannell

Michele Charlton

Melanie Jollymore

PHOTOGRAPHY

Chris Geworsky

Daniel Abriel

Katie MacLeod

DESIGN

Barbara Raymont

ACG Studio

5743 University Avenue, Suite 98

PO Box 15000

Halifax, NS B3H 4R2

Publications Mail Agreement No. 40010676

Return undeliverable Canadian address to:

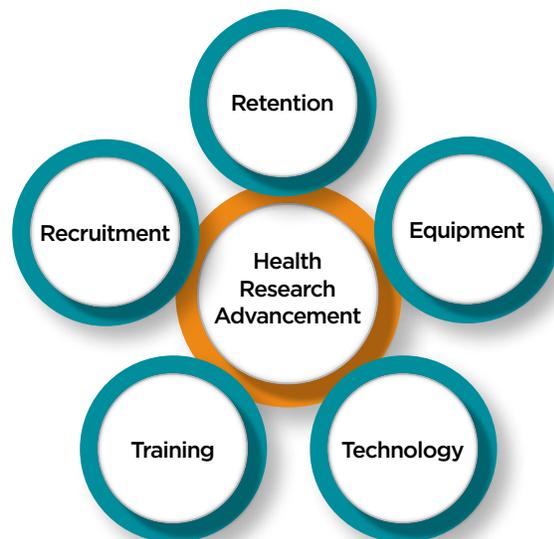
Dalhousie Medical Research Foundation

TRAILBLAZING RESEARCH REQUIRES EXCEPTIONAL TALENT

Dalhousie’s Faculties of Medicine, Health and Dentistry produce groundbreaking research that is world-renowned and internationally competitive. Collaborative and trailblazing health research is revolutionizing health care both locally and abroad while positioning the Maritimes firmly on the world-stage. Ensuring the continuity of a fulsome research complement at Dalhousie’s Faculties of Medicine, Health, and Dentistry requires the recruitment, retention, and training of exceptional talent, along with access to modern technology and equipment that ensures efficient and effective output. Top-notch medical research outcomes mean better treatments and ultimately cures for the many diseases and conditions that impact people around the globe. Dalhousie Medical Research Foundation (DMRF) strives to support health-related researchers at Dalhousie by fundraising to provide the best resources available to bolster their leading-edge work. Whether it’s talent, equipment, training, or space, DMRF exists to advance health research to positively impact health and wellness.

This issue of The Philanthropist focuses on collaboration and how bringing great minds together to work in synergy can have a powerful impact on health-related research outcomes. We are very fortunate in Nova Scotia because we have a unique research ecosystem that is built on collaboration, not just between our researchers, but between organizations. We are proud to work with Dalhousie Advancement, various corporations, hospital partners, associations, the Province, and the Nova Scotia Health Authority – to name a few.

This issue also highlights collaboration across disciplines and geographic borders to produce outstanding projects that are advancing health research. We also feature the DMRF Molly Appeal Campaign. This year it is the most broad-based Molly Appeal for research funding in the 38-year history of the annual campaign. We are excited to share the exceptional collaborative nature of this vast project that focuses on inflammation, immunity, infection and virology (I3V) and genomics. We hope you enjoy what you read and thank you for supporting research through DMRF. 🌱



CONTENTS

Message from CEO & Chair	3	Molly Patient Story	15
Cancer Immunotherapy	4	Molly Patient Story	16
Graduate Students	6	CIHR Appointment	18
NS IHRIS	8	On Collaboration	20
Digital Health	10	Supporting Molly	21
Molly Appeal	12	Legacy Giving	22
Molly Researchers	13		

MESSAGE FROM THE CHAIR AND CEO



Allan Shaw, DMRF Board Chair



Brian Thompson, DMRF CEO

With the theme of collaboration in mind, we are pleased to focus our attention in this issue of *The Philanthropist* on the power of partnerships. We work with researchers and donors in mind, endeavouring to align our priorities with those of our region, the country, and the globe. While health concerns vary across geographic areas, there are many commonalities that require cohesive efforts, making collaboration crucial. We move forward with this conviction as our guide.

As it stands today, Canada faces many challenges related to health and health care, and Nova Scotia is no exception. In an era where timely access to quality care is on the decline and health care spending accounts for nearly 45 per cent of the provincial budget, there exists an urgent need in Nova Scotia to re-evaluate the efficacy of the current system and develop new approaches to improve health, across the province. We are proud to be working in strong partnership with many organizations and institutions to ensure we are advancing health research.

2018 has brought us many reasons to be proud - our greatest collaborator, Dalhousie University, is celebrating its 200th birthday, and Dalhousie Medical School is recognizing 150 years of producing thousands of outstanding physicians and researchers. This is good news for all of us. Dalhousie University is a recognized academic leader in this region and across the country, and our Faculties of Health, Medicine, and Dentistry are impacting healthcare in ways that significantly improve the quality of our lives.

At DMRF, we know the impact our researchers are making. We are world-class. The time, dedication and talent it takes to find quicker and more accurate diagnosis, better treatments and, of course, cures, cannot be understated. As donors, you are making a difference with every gift you make. We are grateful for your generosity.

TOGETHER, WE CAN MAKE A DIFFERENCE

Sincerely,

A handwritten signature in blue ink that reads "Allan Shaw".

ALLAN SHAW
Chair, DMRF Board

A handwritten signature in blue ink that reads "Brian Thompson".

BRIAN THOMPSON
CEO, DMRF

Dalhousie-led project awarded \$3.2 million to develop **cutting-edge** cancer immunotherapy



LR: Prathyusha Konda, Youra Kim (PhD Students), Dr. Shashi Gujar and Dr. Barry Kennedy (Post-Doctoral Fellow)

“My team and I are privileged to lead this international initiative, collaborating with experts across the globe on the next frontier of cancer research.”

– Dr. Shashi Gujar



ON INNOVATION

When Dr. Shashi Gujar came to Dalhousie Medical School 10 years ago for postdoctoral training, he couldn't have imagined where he would be today. Now a cancer immunologist with the Faculty of Medicine, Dr. Gujar works with experts around the world, and it's trailblazing new cancer immunotherapies that could cure advanced melanoma.

“I knew that Dalhousie had world-class leadership and infrastructure in terms of cancer research, and I wanted to be a part of that,” says Dr. Gujar. “During my postdoctoral training at Dalhousie, I investigated novel cancer-fighting viruses called “oncolytic viruses,” and this opened my eyes to a world of possibility in terms of actually being able to dismantle this incredibly destructive disease.”

The first of these oncolytic viruses was recently approved by the FDA for the treatment of advanced melanoma, the deadliest form of skin cancer. Now, Dr. Gujar is taking things a step further, and has recently received a prestigious grant from the U.S. National Institutes of Health (NIH) to pursue another novel treatment. Totalling \$3.2 million CAD, the NIH five-year operating grant is extremely rare, with a success rate of around 10-12 per cent.

“My team and I are privileged to lead this international initiative, collaborating with experts across the globe on the next frontier of cancer

research,” says Dr. Gujar. “As with oncolytic viruses, our goal is to train the immune system to recognize cancer cells, and to fight them off on its own.”

As a lead on this new project, Dr. Gujar is working with co-lead Dr. Sherri McFarland, a professor at the University of North Carolina, and other collaborators including Dr. Steven F. Morris, melanoma surgeon and Dalhousie professor, and Dr. Randolph Thummel, a professor at the University of Houston. Through this NIH grant, Dr. Gujar and his team are developing immune-modulating, light-activated ruthenium compounds for the treatment of melanoma, which are already proving effective in early laboratory studies. Applied to melanoma lesions on the skin, the compounds are then subjected to light in order to kill the melanoma cells and subsequently teach the immune system to recognize and eliminate other metastatic cancer cells present in the body.

Teaching the immune system to identify and attack cancer cells on its own is a major breakthrough that could increase survival rates exponentially. Today, melanoma is very difficult to treat once it spreads beyond the initial lesion, with the survival rate for advanced melanoma sitting at less than five percent. This new treatment could help us improve patient survival rates for

advanced melanoma by using our own immune systems, and allow us to avoid harsh treatments like radiation and chemotherapy, as well as their debilitating side effects.

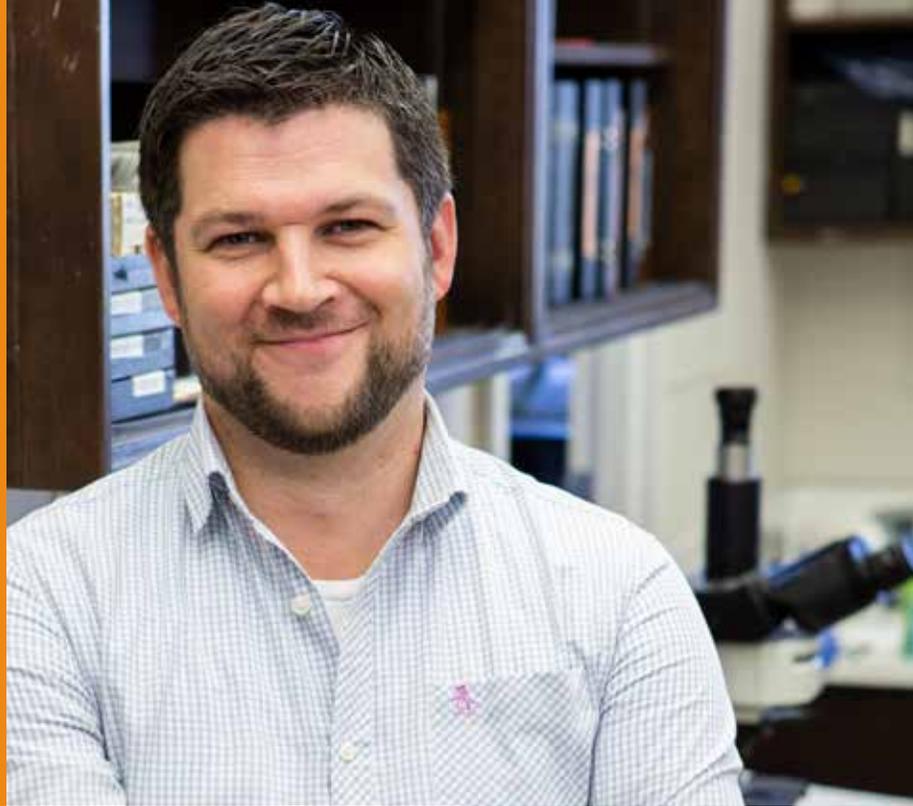
“The treatment is similar in concept to a vaccine in that once the immune system learns to target cancer on its own, it can do so time and time again. Our hope is that by training our immune systems, we can establish long term, cancer-free health.”

After pre-clinical testing of the treatment in Dr. Gujar's Halifax laboratory, the treatment will enter the clinical trial phase, within approximately five years. This could mean a new, more effective treatment for advanced melanoma, available within the next decade.

Additionally, Dr. Gujar has ongoing international collaborations with leading experts in France (Dr. Guido), Germany (Dr. Stevanovic), Denmark (Dr. Nielsen), England (Dr. Weekes), Israel (Dr. Larisch) and USA (Dr. Gygi at Harvard, and Dr. Mancias at Dana Farber Cancer Research Institute). Through this global network, he is also actively working to develop other personalized cancer immunotherapies.

Dr. Gujar notes that this kind of internationally competitive, cutting-edge cancer research at Dalhousie would not be possible without DMRF's “invaluable and indispensable support.” 🙏

Supporting graduate students: the backbone of research



RESEARCH TRAINEES

Drew DeBay

As research trainees, graduate students carry out important research under the guidance of faculty members. Without graduate students, research capacity and progress at Dalhousie's Faculty of Medicine would be substantially diminished, and life-saving knowledge would be generated at a much slower rate.

"Graduate students are essential to the development of new knowledge in science in medicine," says Dr. Roger McLeod, Associate Dean of Research at Dalhousie's Faculty of Medicine. "While faculty members initiate the ideas and solicit the funding to carry out the research, it is the graduate students who test those ideas and are the hands and minds that do the work. In effect, they are the engines that allow research to progress."

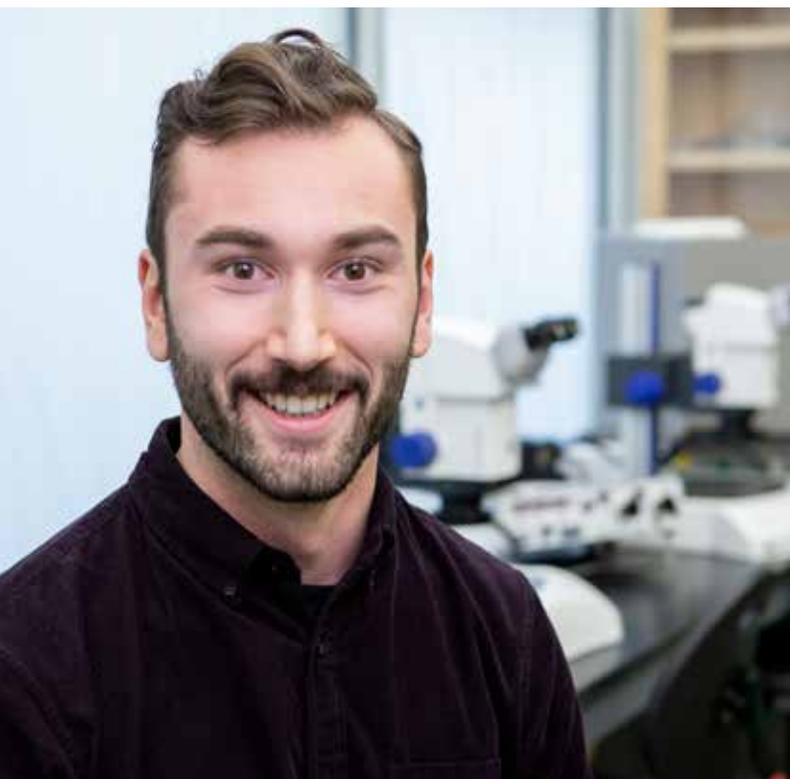
As every engine requires fuel to run, so too do graduate students as they dedicate years of their lives to medical research. That's why, in this past year, DMRF actively raised funds to support graduate students at Dalhousie Medical School, as they work to uncover knowledge and new approaches to identify and treat some of the most threatening health conditions of our time.

Financial support for graduate students means they can afford rent, food, tuition and the general cost of living while they carry out their research. It's what reduces the amount of debt they take on as a result of their decision to go to grad school and pursue research, and can often mean the difference between going to grad school, and not.

"With support from DMRF, I can focus on what really matters—the research," says senior PhD student, Drew DeBay. "The generosity of DMRF and their donors has been incredible."

Studying Alzheimer's disease under Dr. Sultan Darvesh, a clinical neurologist at the QEII Health Sciences Centre and Professor in the Department of Medical Neuroscience at Dalhousie University, Drew's project focuses on the development of a new diagnostic test to help identify Alzheimer's at its earliest stages. If successfully implemented, this test could be used to help evaluate emerging treatments aimed at halting and reversing the progression of the disease.

To date, efforts to diagnose Alzheimer's at an early stage have been compromised by the fact that the plaques and tangles in the brain that are typically associated with the disease can also be found in approximately 30% of cognitively normal older adults. Pursuing an alternative biomarker for the disease, Drew, Dr. Darvesh and their team have focused on a protein called butyrylcholinesterase (BChE), and have demonstrated



Keon Collett

that it too presents in high levels in the brains of Alzheimer's disease patients. With this knowledge, the team has developed a radiotracer to target BChE in brain imaging scans, and using this approach, they have demonstrated the ability to effectively distinguish an Alzheimer's brain from that of a healthy control in animal models. This represents a critical step towards clinical trials in humans, which the team anticipates reaching in as little as three years. "This research has been the

culmination of decades of work from Dr. Darvesh, and his team and I feel very fortunate to have been a part of these pursuits," Drew says.

By providing an accurate early diagnosis, this work could change the lives of millions around the world affected by Alzheimer's disease, including patients, families and caregivers. Beyond conducting this important research in Halifax, DMRF's support has also enabled Drew to participate in international Alzheimer's conferences in places like Copenhagen and London, in order to learn about other emerging research, find synergies, and develop meaningful connections with experts around the world in order to one day find a cure for this devastating disease.

Working at the other end of the lifecycle, Dalhousie graduate student Keon Collett is studying infant leukemia, an aggressive form of blood cancer that occurs in children under the age of one. Working with Dr. Jason Berman, a Pediatric Oncologist at the IWK Health Centre and Professor at Dalhousie Medical School, Keon is using zebrafish to model and study the progression of infant leukemia, and to test different compounds to treat it.

"I moved here from Edmonton to study under Dr. Berman, knowing of his innovative work with zebrafish," says Keon, noting that zebrafish are optimal model organisms to study hematopoiesis and blood cancer. And, because zebrafish develop substantially faster than mice, Keon and his team are able to complete drug screens in their Halifax lab over the course of weeks, rather than months, or even years.

"The five-year survival rate for infant leukemia is less than 50 per cent, even with chemotherapy. Our ultimate goal is to find a novel treatment to change that."

For Keon, being able to study infant leukemia means that he could one day develop more effective treatments for infant leukemia patients around the world—something that he can personally identify with after his own battle with cancer. Diagnosed with Non-Hodgkin's lymphoma at the age of 19, Keon went through chemotherapy and radiation, and is now in remission at the age of 23. Today, Keon is humbled to be able to assist others through his research, pursuing novel treatments that could provide better outcomes for vulnerable young patients.

Keon is grateful to Dr. Berman for his ongoing guidance, and to the Phoebe Rose Rocks Foundation, Beatrice Hunter Cancer Research Institute and DMRF for their immense support. He notes that research is a team effort, including not only the graduate student and the supervisor, but other team members, collaborators, and just as importantly, donors.

"Without institutions and private donors supporting cancer research and research trainees like myself, much of this work simply would not happen." 🌱

Introducing the Nova Scotia Integrated Health Research and Innovation Strategy

BRIDGING THE GAP

Dr. Alice Aiken



Led by a team of collaborators from Dalhousie, the other Nova Scotia post-secondary institutions engaged in health research, the NSHA, the IWK, and the Government of Nova Scotia, the Nova Scotia Integrated Health Research and Innovation Strategy (NS IHRIS) is a new, pan-provincial network supporting the health research priorities of Nova Scotia and its member organizations.

Bridging the gap between academic researchers, health authorities, government, industry and key stakeholder groups, the goal of the network is to improve health and health care in Nova Scotia, through research and innovation.

“This is the first time the provincial government, health authorities, post-secondary institutions, industry and the public will bring their research and expertise together, at the same table, to address critical health issues in Nova Scotia,” says Dr. Aiken. “We have a wealth of research, resources and expertise in this province, and by leveraging our collective strengths, we can have a much greater impact.”

Since joining Dalhousie’s Faculty in 2016, Dr. Aiken has been working toward system change, with the goal of supporting alignment in the province between research institutions, clinicians and government, as well as critical system challenges like inaccessible health data. Today, with a team of key experts and stakeholders onboard, including the Department of Health and Wellness, Department of Labour and Advanced Education and Department of Business, the Nova Scotia Health Authority and the IWK, Dalhousie Medical Research Foundation, the Nova Scotia Health Research Foundation, multiple post-secondary academic institutions, and industry partners, the NS IHRIS will lead the change and drive the collaborative health research and innovation agenda in Nova Scotia.

“The Faculty of Medicine is very pleased to be a member of the team developing a health research and innovation strategy for the province. This collaborative research strategy

will aim to integrate researchers with opportunities to investigate and ultimately improve the health of people living in Nova Scotia,” says Dr. David Anderson, Dean of Dalhousie University’s Faculty of Medicine. “Furthermore, we have the building blocks in place here to not only advance health research in this region, but to serve as a model in national health care reform for the rest of Canada.”

Indeed, with Nova Scotia having just two health authorities working closely together, a major university with a medical school and a comprehensive list of health programs, support from the provincial government, and six other post-secondary institutions also working in health research and care, there is a tremendous opportunity to come together and find synergies with the NS IHRIS, in a truly competitive way.

One of the first outcomes of the NS IHRIS will be the establishment of an asset map to identify what research is happening in the province and where, and what data currently exists. Following this, the establishment of an accessible, integrated database to share relevant data across all network members will expedite research progress and improve health care practice and policy through evidence-informed decision making.

“Where today, the province conducts a lot of its own research on primary areas such as child and youth mental health, for example, tomorrow, they will simply be able to tap into resources like Dalhousie’s Dr. Mike Ungar, a world expert in child and youth resilience, to harness the data they need around best practices,” says Dr. Aiken. “Similarly, a policy expert seeking information on the social determinants of health could spark a collaboration with St. Francis Xavier University, understanding that they are conducting leading research on this very topic.”

In addition to providing government, researchers and health professionals with the information and resources they need to solve the health issues of our time, IHRIS will also provide opportunities to collaborate with industry partners in the same manner. Through an understanding of what expertise lies where, the network will open the doors to new partnerships wherein capacity building can occur quickly, and novel treatments and prevention strategies can be implemented.

“This is about being proactive, looking at all angles, and improving health research and innovation across the spectrum using our combined resources,” says Dr. Aiken. “With the networks and expertise we have in this province, I believe we have a real advantage when it comes to this task in that we’re powerful enough to have a large impact, and small enough to actually get it done,” says Dr. Aiken.

We look forward to supporting the NS IHRIS initiative in the coming months. Together, with support from government, institutions and organizations like DMRF, we can improve health in Nova Scotia, across the entire lifecycle. 🏡

“This is the first time the provincial government, health authorities, post-secondary institutions, industry and the public will bring their research and expertise together, at the same table, to address critical health issues in Nova Scotia.”

- Dr. Alice Aiken

Dr. David Anderson



The digital and predictive **health** initiative

BETTER DATA, FOR BETTER HEALTH

BETTER HEALTH

“We aim to do work that’s going to improve the lives of the people of this region, and also generate data and knowledge that is relevant on an international scale. With this initiative, we have the opportunity to do both.”

– Dr. David Anderson, Dean of Medicine, Dalhousie University

Demographically, Nova Scotia has a large aging population and a high prevalence of chronic disease. These facts create an urgent need for new innovations in health to better serve the local population, and also offer an opportunity for Nova Scotia to become a highly informative data sample for researchers and health professionals around the world. The end goal: improve patient outcomes.

A significant roadblock to the advancement of health care in Nova Scotia is the disorganization and inaccessibility of our health data currently. With an excess of different software platforms being used across the province, limited electronic data resources and a severe lack of data sharing between jurisdictions, health researchers and clinicians are limited in their capacity to access and leverage important information to uncover meaningful discoveries, and make evidence-based decisions to improve patient outcomes.

That’s why, over the past few months, DMRF has been working hard to support the *Digital & Predictive Health Initiative*. Aimed at alleviating current system challenges and generating opportunities for advances in health, the *Digital and Predictive Health Initiative* is a multi-



Brian Thompson, DMRF CEO

disciplinary, collaborative effort focused on research and innovation related to data collection, storage, analysis, access, linking and sharing.

“The preparation and execution of this initiative will entail a collaborative effort between key stakeholders in the Nova Scotia health ecosystem, including Dalhousie Medical Research Foundation, the Nova Scotia Health Authority (NSHA), the IWK Health Centre (IWK), the Faculties of Medicine, Health, Dentistry and Computer Science at Dalhousie

University, the Provincial and Federal governments, Health Data Nova Scotia, The Maritime SPOR SUPPORT Unit, post-secondary institutions, Innovacorp, and other private sector partners,” says Brian Thompson, CEO, Dalhousie Medical Research Foundation. “The goal is to work together to leverage strengths in current infrastructure, bridge gaps, and ultimately reform health data practice and policy to help improve patient success and expedite innovations in health.”



Dr. Gabriela Ilie, Endowed Soillse Research Scientist in Prostate Cancer Quality of Life and Assistant Professor at Dalhousie University

Dr. Samuel Stewart, Director of Health Data Nova Scotia

Working across the provincial spectrum of research institutions, hospitals and clinics, the *Digital & Predictive Health Initiative* will address key issues such as patient record keeping, access to data, the legalities around data sharing, privacy and confidentiality, and the implementation of advanced technology data systems to equip researchers and health professionals to better serve patients.

Dr. Gabriela Ilie, Endowed Soillse Research Scientist in Prostate Cancer Quality of Life and Assistant Professor at Dalhousie University, can already envision the benefits of these kinds of advancements in practice. “The novel data I’ve collected through my research will allow us to make better decisions for patients, provide new resources to address their needs, and monitor their progress at a level we never have before. Having better data systems in place as a result of this project will help advance my research even further, and will enable others to use my data to improve the quality of life of cancer patients across the country, and around the world.”

With existing expertise in data storage and analytics already in place in

Nova Scotia, there is indeed a great opportunity for capacity building to reach this new reality. Current efforts by Health Data Nova Scotia, for example, are already underway to create consistent data standards across the province.

“We have the infrastructure for innovative AI development here in Nova Scotia, with a cutting-edge HADOOP server that has an unparalleled capacity for big data and distributed learning,” says Dr. Samuel Stewart, Director of Health Data Nova Scotia. “By taking advantage of this technology, we can leverage our existing resources to achieve unthinkable breakthroughs in health and medicine.”

Combining these with other strengths in the province in the area of health data, such as those of The Maritime SPOR SUPPORT Unit, for example, can have a powerful result. And, it just so happens that Nova Scotia’s health care system offers a favourable environment for the implementation of novel data innovations like these, with the NSHA and IWK working closely toward common goals rather than operating as several fragmented health authorities. “We have a real

advantage and a real opportunity here,” explains Dr. Alice Aiken, Vice-President of Research at Dalhousie’s Faculty of Health. “Our unique model provides an excellent opportunity to layer on data systems that work across the board at a provincial level, and that can seamlessly interact within the health care system.”

Of course, in addition to advancing both health research and health care in Nova Scotia at both the patient and systems level, this pioneering initiative will also help to attract world-class talent to the region and stimulate the economy through the creation of new business ventures, jobs and commercial opportunities surrounding novel treatments. In fact, with an industry partner already onboard and others waiting in the wings, the potential herein is not only promising, but growing.

DMRF is thrilled to support this crucial opportunity for Nova Scotia to store, access and use health data, better. By developing a more effective, innovative data system in Nova Scotia, it is our firm belief that we can transform our ability to prevent disease, discover research breakthroughs and improve health, locally across the globe. 🌱



Inflammation, Immunity, Infection, Virology (I3V) & Genomics

This fall, DMRF has launched the most broad-based Molly Appeal for research funding in the 38-year history of the annual campaign. In the past, we have focused on a particular area of research—cardiovascular disease, or cancer, or neuroscience.

This year, the equipment and training program we are seeking to fund are so powerful and so widely needed, they will have a huge impact on collaborative efforts across almost every area of research.

We are appealing to Maritimers to help our researchers secure Dalhousie Medical School's first high-throughput scanning microscope, the ImageStreamX Mark II.

This equipment allows researchers to visualize not just the surfaces but the insides of 5,000 cells per second—125 times faster than conventional cell-analysis equipment.

As you can imagine, this kind of processing power provides researchers with vast volumes of data to help them understand all kinds of diseases—infections, cancers, autoimmune and inflammatory disorders, cardiovascular diseases, brain diseases, rare genetic diseases, and more.

At the same time, researchers are unravelling the secrets of DNA and the genetic underpinnings of disease. Not only are they examining human genes—every human cell contains 30,000 genes—they are also studying thousands of genes found in disease-causing bacteria, fungi, viruses and parasites. The amount of data researchers generate with such sophisticated equipment is astounding. It is no longer humanly possible to crunch the numbers to find disease-preventing and treating answers.

That's why this year's Molly Appeal is also raising funds to help launch the Dalhousie Genome Informatics Training Program.

This graduate-level training program will train a new generation of technological wizards with the rare ability to develop and apply computer algorithms to analyze the staggering amount of biological data coming out of our research labs.

Thank you to all donors who continue to support DMRF's Molly Appeal. Your giving is changing and saving lives across this country and beyond.

Gene jumping in microbes:

Dr. John Archibald explores how microbes adapt to survive

Dr. John Archibald and his team are studying the nuts and bolts of “lateral gene transfer,” a process in which microbes grab genes from another species in order to develop resistance to antibiotics and other antimicrobials. They’re analyzing the DNA of bacteria—and more complex organisms such as fungi and parasites—using computers to pinpoint the gene transfers and shed light on potentially more effective approaches to treating infections.



Keeping an eye on genetic diseases:

Dr. Johane Robitaille uncovers genes in search of therapies for inherited eye disease

Pediatric ophthalmologist Dr. Johane Robitaille and her team have discovered five genes for FEVR (familial exudative vitreoretinopathy), a genetic disease of disordered blood-vessel growth in the eye that often leads to visual impairment or blindness. They are using these genetic discoveries to identify and test potential therapies for FEVR.



Fishing for answers:

Dr. Jason Berman turns to zebrafish for clues to customized cancer treatments

Pediatric oncologist and professor Dr. Jason Berman is growing human cancers—including forms of leukemia that are unique to children with Down Syndrome—in zebrafish to see how the cancers respond to drugs and interact with their surrounding environment. His goal is to use the fish to find what cancer treatments will best treat each patient’s unique form of the disease.



From lizard virus to cancer treatment:

Dr. Roy Duncan discovers a viral superpower to harness against cancer

Dr. Roy Duncan is taking what he’s learned about reovirus in lizards and chickens and applying it to cures for human cancers. He and his team are learning how to take a cell-to-cell fusion mechanism they discovered in the reovirus and put it into cancer-killing viruses to rapidly destroy tumours without harming healthy cells.



Cellular garbage and chronic disease:

Dr. Thomas Pulinilkunnil learns how metabolic disorders affect health and the heart

Dalhousie Medicine New Brunswick biochemistry researcher Dr. Thomas Pulinilkunnil studies what happens inside the cells of the heart when compromised metabolism—due, for example, to poor diet, lack of exercise and stress—interferes with cells’ ability to clear out the waste. He’s learning how problems with our cellular waste-disposal and recycling mechanisms lead to disease, and how these problems can be corrected to achieve a state of health.



Manipulating immunity:

Dr. Jean Marshall explores ways to prevent allergies, cancers and inflammation

Dr. Jean Marshall is studying the immune system which is critical for fighting infections and cancer but can also cause diseases such as allergies and arthritis. Dr. Marshall and her collaborators are finding out more about the human immune system and developing new strategies to prevent the development of allergies and cancer and enhance the healing process in inflammatory diseases.



Eradicating brain tumours:

Dr. Adrienne Weeks seeks solutions to deadly and dangerous brain tumours

Neurosurgeon Dr. Adrienne Weeks spends as much time as possible in her lab, looking for ways to resolve both benign and malignant tumours. She aims to disable “stress granules,” molecules that glioblastoma cells produce to protect themselves from treatments, and to find genetic mutations that can be targeted with medication to stop meningiomas, non-cancerous tumours that can nonetheless damage vital functions.



Targeting genetic mutations:

Dr. Chris McMaster searches for drugs to treat inherited diseases

Dr. Chris McMaster and his team have identified genetic mutations that cause three inherited diseases with catastrophic consequences: Parkinson’s disease, muscular dystrophy and a blinding eye disease known as FEVR. Now the researchers are hunting for drugs that will treat these diseases.



Immune therapies for cancer:

Dr. Shashi Gujar finds ways to flag cancer to the immune system

Dr. Shashi Gujar is exploring various means of stripping cancer of its ability to hide from the immune system. These include infecting cancer cells with viruses that flag cancer cells so that the immune system recognizes and kills them. They are also working to create light-activated compounds that alert the immune system to melanoma cells on the surface of the skin.



Parasites, the gut and your health:

Dr. Andrew Roger examines impact of parasites on human microbiome and health

Dr. Andrew Roger is learning how a common gut parasite known as *Blastocystis* affects the immune system, other organisms in the gut, and how antibiotics affect this balance. *Blastocystis* is benign in most people but in some cases causes diarrhea and even more severe symptoms of IBS (irritable bowel syndrome). The researchers also want to know how the host’s immune system, general health and microbiome composition affect susceptibility to problems with this parasite.



First line of defence:

Dr. Francesca Di Cara explores how innate immunity may be altered to stop disease

Immunity researcher Dr. Francesca Di Cara is learning how the innate immune system—which we are born with and which is our first line of defense against viruses, bacteria and cancer—functions. Her ultimate goal is to identify drugs that can influence innate immunity, boosting it to fight infections and cancer, or dampening it to treat chronic inflammatory disorders.



Searching for new antivirals:

Dr. Craig McCormick takes aim at herpes and influenza

Dr. Craig McCormick and his team are pursuing new antiviral medications for herpes and influenza, common viruses that cause everything from recurring rashes to life-threatening respiratory illness. They’re learning how to harness cells’ own internal protective mechanisms to resist infection, with agents they are exploring as potential new antivirals.



Sue Duncan thriving in spite of potentially catastrophic brain infection, allergic drug reaction, and ongoing autoimmune disorder



PATIENT STORY

No one can explain exactly why Sue Duncan, upon her return from Cuba in 2016, was suddenly struck by viral encephalitis, a serious type of brain infection that can be caused by several different viruses.

The theory is that two pre-existing conditions collided in a perfect storm. Sue had been diagnosed with a lupus-like autoimmune disease at age 29, and as a child had contracted a herpes virus eye infection that occasionally caused a cold sore on her lip. Doctors and scientists suspect that the stress of travelling woke up the herpes virus, which had been lying dormant in her nerves. Something about her irregular immune system may have confused the virus. Instead of heading to the eye or lip, it took a wrong turn and headed to her brain.

The infection took hold quickly and became life-threatening. A series of miracles saved her life.

“I was talking to my sister in Montreal and I thought I was perfectly normal, but she later told me that I was actually going silent, taking long pauses,” says Sue. “She knew something was wrong, although I thought she was overreacting at the time.”

Sue’s sister persisted in calling for help, setting in motion a series of calls between other sisters in Ontario and Alberta, and Sue’s adult children in Toronto. They were able to get in touch with her husband, who was away at a conference, as well as local friends who broke into the house, found Sue having seizures, and called an ambulance.

When she arrived unconscious at the Dartmouth General Hospital, the young resident who saw her immediately prescribed the only antiviral available. He had seen a similar case and knew there was no time to wait for the results of a diagnostic test. The antiviral was for herpes-related encephalitis; test results later revealed that herpes was indeed the virus behind Sue’s nearly-fatal infection.

“I was so lucky that the one antiviral treatment available turned out to be for the virus I had.”

Sue proved herself resilient. Although full recovery took months, she soon returned to her church choir, playing guitar and her studies to certify as a parish nurse. She graduated only months after leaving the hospital.

In June 2017, the sister who had sounded the alarm to get Sue to the hospital little more than a year earlier succumbed to the complications of breast cancer. With the stress of this great loss, Sue’s autoimmune disease acted up again. Unfortunately, she experienced a rare and serious allergic reaction to one of the medications.

“It was as if I had a burn over most of my body,” says Sue. “I lost much of the skin on my upper body and developed sepsis.”

Thanks to excellent care at the QEII, the constant love and support of her family, and her own tenacity and faith, Sue survived and rallied.

“I’m a very lucky person” she says. “My grown children left their jobs in

Toronto to take shifts at the hospital and at home with my husband, sisters and sister-in-law. Through it all, they all stayed positive and supported me and each other. This was so important in my recovery.”

Sue is also grateful to the team of professionals—including her family physician, specialists in dermatology, rheumatology, immunology, infectious diseases, and internal medicine, as well as many residents and nurses—for their knowledgeable care.

Now, Sue is back to her productive life. She works as a parish nurse in Dartmouth and is active with her family, friends and in her community. And, she is throwing her support behind Dalhousie Medical Research Foundation’s 2018-19 Molly Appeal. Funds raised will help researchers at Dalhousie Medical School discover new antiviral drugs and gain insights into how the immune system normally fights infections and why irregular immune systems can lead to chronic autoimmune disease like lupus.

“I am fortunate to be alive today and to have a great future ahead of me,” says Sue. “I’m reaping the benefits of previous research and the expertise of our researchers and clinicians.

“The Molly Appeal will assist our researchers and clinicians to expand their understanding and discover new treatments of many more conditions and infections,” says Sue. “As the research advances, even more people will be benefit.” 🌱

Leukemia treatment tailored to Down syndrome eases effects of chemo for Ella Fraser

“It was amazing because in walks this rock star oncologist and tells us he is chairing an international study in kids with Down syndrome AML,” says Kent. “We felt so much better after we did some research on Dr. Berman and saw all the high-level studies and publications with his name on them.”

– Kent Fraser

PATIENT STORY

Rebecca and Kent Fraser were not prepared for all of the information they received just hours after the birth of their second daughter, Ella, in the summer of 2016.

As they adjusted to the unexpected fact that Ella was born with Down syndrome, it was more than they could take in to hear that their beautiful new baby faced heightened risks of such complications as heart defects, vision loss, spinal problems and leukemia.

“It was a blur,” says Rebecca. “The birth had gone really quickly—she was born at home before the midwife even arrived—and then we were hearing she had Down syndrome and what all the consequences might be.”

As they settled in with their new baby, the couple learned as much as they could about Down syndrome—also known as Trisomy 21—a genetic disorder in which the child is born with an extra copy of the 21st chromosome. They found a wealth of knowledge and support in the Nova Scotia Down Syndrome Society.

“In the beginning, my ignorance translated into fear, because I didn’t know what to expect and there are so many potential health issues,” recalls Kent. “The positive support from the Down syndrome community was very reassuring, as was the thorough medical monitoring Ella received.”

The Frasers did not have long to bask in the glow of their new daughter’s bright and engaging personality. In the summer of 2017, Ella’s one-year bloodwork revealed low levels of iron.

“We’re vegetarian so we thought it might be that and began feeding her as many iron-rich foods as possible,” Rebecca says. “We thought the problem would be fixed but when the results of the re-test came in, her iron was critically low.”

Thus began the family’s journey with childhood leukemia. As they’d been warned, children with Down syndrome face a lifetime leukemia risk 20 times that of the general population. Further tests revealed that Ella had a version of leukemia unique to very young children with Down syndrome, known as DS AML (Down Syndrome Acute Myelogenous Leukemia).

As they faced this terrifying new prospect, the Frasers were relieved to meet Dr. Jason Berman, a pediatric hematologist-oncologist at Dalhousie Medical School and the IWK Health Centre, and a leading AML researcher.

“It was amazing because in walks this rock star oncologist and tells us he is chairing an international study in kids with Down syndrome AML,” says Kent. “We felt so much better after we did some research on Dr. Berman and saw all the high-level studies and publications with his name on them.”

The Frasers agreed to take part in the study. It is the first-ever clinical trial to tailor treatment to match the response to treatment in DS AML, so that children with better responses receive less intense treatment.

“While children with Down syndrome are more likely to develop AML, the disease behaves differently in these children and they respond better to chemotherapy than children without Down syndrome, although the side effects can be worse,” says Dr. Berman. “This study assesses children’s response to the first round of chemotherapy and sorts them into two groups—those who respond well receive less-intense therapy, while those who don’t respond as well receive a stepped-up treatment protocol.”

Fortunately, Ella responded well to the first round of chemotherapy and was put in the group to receive five less intensive rounds of chemo, eliminating high-dose cytarabine from her treatment regimen.



“We could see the difference compared to the other kids with leukemia we would see at the hospital,” says Rebecca, noting that she and Kent took shifts living the better part of six months at the IWK Health Centre with Ella. “Kids on standard treatment protocols had fevers and infections, extreme light sensitivity, feeding tubes... Ella had very few problems, just a little less energy and appetite, and she didn’t lose her hair until after the last round.”

In fact, Ella did so well on the study protocol, she and her parents were able to take short leaves from the hospital between rounds of chemo. This allowed brief but welcome returns to normal for the family—in particular, older sister Marin, who thrived on having her whole family home and together for days at a time.

Ella rang the bell marking her last chemo treatment on June 29, 2018. She is in full remission, with as much as a 90 per cent chance—or more—of a complete and permanent cure.

Now, the Frasers are giving back by supporting Dalhousie Medical Research Foundation’s 2018-19 Molly Appeal, which is raising funds for cell-analysis equipment and a genome informatics training program that will accelerate Dr. Berman’s work to better understand and treat DS AML and many other forms of blood cancer.

Ella is thriving now, thanks to prompt diagnosis and the gentle yet effective treatment she received on the clinical trial, and she and her parents and sister can focus on creating happy times together. 🌱



**DR. MCMASTER'S
RESEARCH**

DALHOUSIE RESEARCHER LANDS **PRESTIGIOUS NEW GENETICS ROLE WITH CIHR**

A recognized leader in genetics, biochemistry and cell biology from Dalhousie has a prestigious new role.

Dr. Christopher McMaster, a Professor at Dalhousie's Faculty of Medicine, has been appointed as the scientific director for the Canadian Institutes of Health Research's (CIHR) Institute of Genetics (IG). The CIHR was created in 2000 under the authority of the Canadian Institutes of Health Research Act and functions as Canada's health research investment agency. The CIHR collaborates with partners and researchers to support the discoveries and innovations that improve our health and strengthen our health care system. Dr. McMaster's new role became effective on July 1, 2018. He is also one of DMRF's Molly Appeal campaign lead investigators (see page 14).

"The appointment of Dr. McMaster to the prestigious role of Scientific Director is a testament to his significant accomplishments as a scientist and leader in his field," says Alice Aiken, Vice-President Research

at Dalhousie. "His innovative research has had a key role in shaping the future of genetic science in Canada and around the world, and we are proud to have a researcher of his caliber part of the Dalhousie University community."

The CIHR's IG supports research on human and model genomes and on all aspects of genetics, basic biochemistry, and cell biology related to health and disease, including the translation of knowledge into health policy and practice, and the societal implications of genetic discoveries.

As Scientific Director, Dr. McMaster will help identify research priorities, develop funding opportunities, build partnerships, and translate research evidence into policy and practice to improve the health of Canadians and people around the world. As a member of CIHR's



As a researcher, Dr. McMaster is a recognized leader in genetics, biochemistry, and cell biology. His research is comprehensive, ranging from basic biochemistry and cell biology, to genomics to determine causal genes for human genetic diseases and drugs for their treatment, to ethical and policy considerations as the field of human genomics becomes increasingly applied to clinical diagnosis and care.

In 2006 he co-founded DeNovaMed, Inc., a biotechnology company that specializes in using computer-aided drug design to drive the synthesis and development of truly new classes of antimicrobials. Dr. McMaster has served as President of DeNovaMed since its inception and CEO since 2015. DeNovaMed is in the final stages of preclinical development and is expecting to start a first-in-human-trial for a new class of antibiotics for the treatment of multidrug-resistant infections.

leadership team, he will also participate in setting and implementing CIHR's strategic direction.

"I look forward to working with and supporting Canada's genetics community," says Dr. McMaster. "Canada has a rich history in training and conducting world class genetics spanning basic, translational, clinical, and outcomes research. There is substantive momentum across all areas that the Institute of Genetics will seek to further foster and grow."

Dr. McMaster's research is broad in interest, ranging from basic biochemistry and cell biology, to genomics. He has identified a potential therapy for congenital sideroblastic anemia, a disease which occurs when the bone marrow fails to produce a sufficient number of healthy red blood cells. He is also developing treatments for familial exudative vitreoretinopathy, a hereditary

disorder that can cause vision loss, and for inherited Parkinson's disease.

"This is a tremendous honour and achievement for Dr. McMaster," says David Anderson, Dean of Dalhousie's Faculty of Medicine. "On behalf of Dalhousie's Faculty of Medicine, I am pleased to congratulate him on his new position. His exemplary commitment to genetics research combined with his outstanding experiences as a leader, scientist and educator at Dalhousie's medical school are well matched for this new role."

There are currently 13 CIHR institutes, which encourage partnership and collaboration across sectors, disciplines and regions. This is the first time one has been located in Atlantic Canada.

DMRF congratulates Dr. McMaster on his new role! 🎉



On Collaboration, from the Deputy Minister of Health

“We need to do a better job at working together, sharing knowledge and leveraging our collective strength to change this, and I believe that Nova Scotia is truly poised to lead transformative change.”

– Ms. Denise Perret

HEALTH CARE

Upon moving to Nova Scotia to take on the role of Deputy Minister of Health in 2017, Ms. Denise Perret was pleased to see the strong desire for collaboration among key health stakeholders in the province. Given the significant challenges that face Canadian health care systems, Ms. Perret was encouraged that Nova Scotia presented such a strong and collegial foundation for research and care.

“In Canada, our various systems of health care have accomplished a great deal. We have highly trained professionals who provide expert and excellent care – but we have not optimized the operation of our system. In general, we pay too much for results that fall short,” says Ms. Perret. “We need to do a better job at working together, sharing knowledge and leveraging our collective strength to change this, and I believe that Nova Scotia is truly poised to lead transformative change.”

Indeed, there exists a strong and rapidly-growing collaborative appetite in Nova Scotia among university health researchers, clinicians, health authorities, government and private sector partners. According to Ms. Perret, this momentum, combined with Nova Scotia’s regional geography and evolving provincial health model, provides the ideal foundation to transform health care and services to improve health outcomes for Nova Scotians, while demonstrating positive change for the rest of Canada as well.

“I’m encouraged by my frequent conversations about health priorities in this province with researchers, clinicians, philanthropic organizations and entrepreneurs,” says Ms. Perret. “I see a real awareness and interest in connecting priorities, maximizing resources and moving forward cohesively, with a collective vision. This is precisely what we need to do to advance the health care system in this province – and in this country– and that is what we are working toward here in Nova Scotia.”

As Deputy Minister of Health, Ms. Perret is pleased to support and participate in the Integrated Health Research and Innovation Strategy (NS IHRIS), an initiative that aims to improve health and health care in Nova Scotia, from a broad, cohesive perspective. The NS IHRIS marks a major milestone as the first wide scale collaboration between the provincial government, health authorities, post-secondary institutions, industry and the public, aimed at addressing the province’s critical health issues.

“In addition to increasing collaboration locally in Nova Scotia between the key players in health, the NS IHRIS and other research initiatives help us form broader partnerships that will move us forward to strengthen our health care system and improve population health,” says Ms. Perret. “We have the building blocks in place in Nova Scotia to do great things here.” 🏡



Ella says 'high five' to medical research.

In 2017, Miss Ella Fraser was diagnosed with Acute Myelogenous Leukemia - unique to young children with Down syndrome. Thanks to medical research and Dr. Jason Berman, Ella received treatment tailored for Down syndrome, easing the side-effects of chemotherapy. Ella rang the bell marking her last treatment June 29, 2018. **100%** of gifts to **DMRF's 2018-19 Molly Appeal** support purchase of cell-analysis equipment, fund a genome informatics training program, and accelerate Dr. Berman's work.

'High five' and giggles to that! For ways to give, and to view Ella's story go to mollyappeal.ca.



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

I support medical 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 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.



WHERE BREAKTHROUGHS BEGIN Please give today: 1.888.866.6559 mollyappeal.ca



LEAVING A LEGACY

PLANNED GIVING. **BECAUSE WE HAVE A PLAN.**

A planned gift through Dalhousie Medical Research Foundation funds ground breaking research at Dalhousie's Faculties of Medicine, Health, and Dentistry. We know the plans we make today impact the outcomes of tomorrow; we witness this every day through the outstanding progress of our researchers. Health research strives to find faster diagnosis, better treatments and ultimately, cures for the diseases and conditions that impact our quality of life and our lifespan.

In October of 2017, we proudly launched the Dalhousie Medical Research Foundation's Legacy Society, to honour those individuals who - after providing for their loved-ones - have graciously remembered the Foundation with a future gift in their estate plan.

Since 1979, DMRF has benefitted from numerous gifts received through bequests helping us meet our mission of funding health research excellence at Dalhousie. It is our intention to thank our legacy donors for their incredible support of the future of medical research and to present them with a gift designed especially for DMRF Legacy Society members.

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, and one day - many years from now - when the gift is received, we will better understand the motivation behind the gift.

For more information, please contact Carol Murray, Manager, Annual and Planned Giving
carol.murray@da.ca | p 902.494.8457 | c 902.233.8767

PHIL FALL 2018

YES! I believe in life-changing medical research!

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 Carol Murray directly regarding Dalhousie Medical Research Foundation, contact:

Tel: 902-494-6565 Email: carol.murray@da.ca Web: www.dmrp.ca
5743 University Avenue, Suite 98 PO Box 15000 Halifax, NS B3H 4R2





You can help our researchers spot a single virus just as quickly.

You can help us purchase powerful technology that will enable researchers to analyze billions of viruses, and spot the bad ones, faster than ever before. This will lead to targeted treatment, and one day a cure, for infectious diseases.

Donate today at MollyAppeal.ca

Dalhousie
MEDICAL RESEARCH
Foundation



The
Molly 
Appeal
for Medical Research



DMRF BREAKTHROUGH BREAKFAST

eggs with a side of hope

On Wednesday, November 7th, 2018, at the Cunard Centre, Dalhousie Medical Research Foundation invites you to join us for our third annual Breakthrough Breakfast: Eggs With a Side of Hope.

The theme of this year's Breakthrough Breakfast is Celebrating Global Research Excellence Happening Right Here. Dalhousie University attracts, retains and develops world-class talent, and our medical researchers are having a global impact. This year, we are thrilled to highlight the outstanding work of Drs. Alon Friedman, Shashi Gujar, Gabriela Ilie, Tony Reiman and more!

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.