



Annual Report April 2020 – March 2021

THE BRAIN REPAIR CENTRE (BRC), A DALHOUSIE UNIVERSITY INSTITUTE, IS A WORLD-CLASS HUB FOR NEUROSCIENCE RESEARCH, INNOVATION AND EDUCATION.

MISSION

PROVIDE PROGRAMS AND SERVICES TO ADVANCE NEUROSCIENCE DISCOVERY, IMPROVE NEUROLOGICAL CLINICAL CARE AND CONTRIBUTE TO THE NOVA SCOTIA ECONOMY THROUGH RESEARCH, INNOVATION AND WORLDWIDE PARTNERSHIPS.

VISION

TO BE THE PREMIER NEUROSCIENCE RESEARCH AND INNOVATION CENTRE IN CANADA BY ATTRACTING THE BEST NEUROSCIENTISTS IN THE WORLD DOING RESEARCH IN NEUROLOGICAL DISEASES AND DISORDERS.







MESSAGE FROM OUR DIRECTOR

The past year was one of adaptation and resilience as we all moved to the new reality brought on by the COVID-19 pandemic. On March 17, 2020, the Brain Repair Centre (BRC) responded to public health directives, closed its office doors and moved to a virtual operation for the balance of the year and into 2021. Although we have had a few face-to-face meetings and two retreats in the interim, our work lives have changed dramatically.

While our optimal engagement has traditionally taken place during in-person connection, discussion, education and collaboration, the BRC has responded well to the changed working environment, which has also opened up new and exciting virtual opportunities. We have been purposeful in leveraging these online opportunities, placing greater emphasis on digital communications.

Last summer, we engaged the services of a public relations company to take a more strategic approach to our communications. This work has helped us beef-up our storytelling, create a more engaging, accessible website and streamline messaging to our various audiences. Simultaneously, we have enhanced our trainee programs and communications. We have been very pleased with our consistent effort to better engage trainees, identifying germain subjects for discussion and taking opportunities to offer people helpful career insights and training. All of these efforts contribute to our objective to improve the way we share our compelling BRC story and highlight the abundance of good work happening inside the organization.

Our team recognized early in the pandemic that, while much of our public programming has been deferred until we can meet face to face again, it offers us a chance to be more reflective and focus on boosting our internal systems, processes and opportunities. As a result, we have a stronger online presence for communications, collaboration and training going forward, knowing we will continue programs like our public lecture series, Research Day and Cluster retreats when it is safe to do so.

Of course, all work came to a virtual halt at the onset of the pandemic, however, after just four months, there was a gradual scale up of research. That being said, we did have to navigate some initial hiccups. Many of our researchers work with colonies of rodents, fish and flies and, in some instances, there was a need to restart breeding programs and reorder animals. The impact of those challenges sometimes included lengthy delays in generating data upon recommencement of experiments, and recalibration and maintenance of instrumentation.

It has been a bumpy and challenging road for many and it will take time for the important research work to catch up. Additionally, there are unforeseen costs associated with these disruptions, which have contributed to lengthening the time for results. The upside of these impediments is the additional scrutiny and insight into the intricacies and vagaries of research due to the pandemic. On a positive note, the research associated with COVID-19 vaccines has helped to create more public awareness of the importance of research, the steps involved and how integral time and patience are to the process. As we all re-emerge from a year, and more, of restrictions, we are hopeful that we can resume in-person meetings and a more normal calendar of events.

Finally, I am excited to tell you about our newest program. We are launching a pilot project to engage the services of a patent lawyer who will assist our Knowledge Translation Grant winners. If the pilot is successful, we hope to ramp up and offer this service to everyone involved with the KT grant initiative. We expect to have initial results in the next fiscal year so that, in next year's annual report, we can demonstrate the uptake and traction for those involved in commercialization of their research.

The past year has allowed us to focus on effectively delivering our message, tap into our members' needs more deeply and to hone and refine our approach to our programs. This trying time gave us the gifts of reflection and the ability to recognize and pursue new opportunities, which will only make us stronger going forward.

Sincerely,

Dr. Victor Rafuse Director, Brain Repair Centre Professor, Dept. of Medical Neuroscience Dalhousie University



Dr. Victor Rafuse Director, Brain Repair Centre Professor, Dept. of Medical Neuroscience, Dalhousie University





EXECUTIVE SUMMARY

In 2020 the world changed and we responded by altering the way we provide programs and services to advance neuroscience discovery. Our lives may look different now but our commitment to improving neurological clinical care through research, innovation and world-wide partnerships remains strong.

A lot can happen in a year, here are the highlights:

- The Brain Repair Centre hosted two in-person meetings with COVID-19 protocols for gathering in place:
 - The Action Mobility Action Project (AMAP) annual meeting was held at White Point Lodge. Areas
 of research included sensory motor, molecular stress, biomechanics and engineering, neuronal
 circuits, spinal cord development, spinal cord injury and ALS.
 - The Traumatic Brain Injury retreat was held at the Inverary Resort and brought together representatives from the Friedman Lab at Dalhousie University and other groups working on brain injuries. Participants attending either in person or virtually presented their research study results on brain injury and discussed plans for the coming year.
- The BRC Oversight Committee saw increased engagement in its virtual format meetings.
- The Dalhousie/Ben-Gurion University research exchange program had to be put on hold, however, it gave organizers time to review the collaboration and plan future opportunities when travel can resume.
- The Dalhousie/Ben-Gurion University joint PhD program and MOU have been completed.
- Joining other national leaders, Dr. Rafuse represented the BRC on the Canadian Brain Research Strategy Working Group.

EXECUTIVE SUMMARY

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- Improved supports for our student researchers were established through Brain Waves, an online meeting group that connected trainees with alumni and others, allowing them to share insights and advice while reflecting on their own academic journeys.
- Awarded six \$1000 grants to support Journal Clubs in their learning efforts. The current Clubs are: Atlantic Mobility Action Project, Interdisciplinary Science, Undergraduate Neuroscience, Vision Science, Acquired Brain Injury and Insect Super Club.
- Awarded nearly \$90,000 in Knowledge Translation grants to researchers, which will allow them to further their research and innovation along the path of commercialization.
- Launched an Intellectual Property Program Mentoring Pilot.
- Delivered Brain Awareness Week in a virtual format; the events were featured on Global TV and CTV Atlantic.
- Working on new promotional material that encourages partnerships between industry and research. The goal is to is to increase awareness of Nova Scotia neuroscience research and secure new industry partnerships and funding.
- Updated our website. It has a new look, is easier to navigate, mobile friendly and works well with social media promotion. We will be keeping it up to date, featuring stories and profiles of researchers from inside the organization.



From left to right: Eleanor Seaman-Bolton, Program Administrator Dr. Victor Rafuse, Director Diana Nichols Nelson, Chief Operating Officer



THE CHALLENGES OF A PANDEMIC

As our Director, Dr. Rafuse, mentioned in his opening letter, the pandemic brought challenges to our scheduled programming. In March, our weeks of planning and work to present Brain Awareness Week (BAW) 2020 were suspended as our events were all to be held in the public domain during the week of March 23 to 27. Unfortunately, we did not have sufficient time to adapt. However, this year we planned a virtual BAW and were happy to be able to reconnect with our public and hold new events for different audiences.

Our newly revived participation with the Brain Bee Competition was postponed. It was recently confirmed that there will be a virtual competition (provincial and national) held in June 2021.

We have had meetings with our Oversight Committee, our Executive Committee and many members. Two of the BRC Clusters were able to proceed with COVID-safe meetings (i.e. AMAP and TBI), however with more stringent lockdowns in place, our other two Clusters (Neurodevelopment and Neurodegeneration) were not able to do so and hope to re-engage in 2021. Our signature event, the Research and Poster Day event, also had to be postponed and we hope to host it before the end of 2021.

THE CHALLENGES OF A PANDEMIC

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Our student travel awards and Dalhousie University and Ben-Gurion University Student Exchange Program were also postponed due to the fact that non-essential travel is not permitted by the University.

As mentioned, we have become more adept in our virtual platforms and we continue to develop and grow our online capabilities, including delivery of our programs. For example, we successfully conducted our Knowledge Translation grant program review utilizing an online process and were very pleased to be able to engage a Florida-based individual as a panelist.

On the whole, much of our programming transitioned online or was adapted to fit the changing environment. We look forward to more in-person-based programming as we move towards a post-pandemic reality.

OVERSIGHT COMMITTEE

We are pleased with the level of engagement this year by the members of our Oversight Committee. This committee continues to support the efforts of the BRC and, despite the pandemic, we witnessed an upsurge in participation. This bodes well for the future in terms of engagement and understanding of the BRC's ongoing endeavours.

BRC/BEN-GURION UNIVERSITY (ISRAEL) COLLABORATION

A BRC/BGU joint research program was planned for 2020-21 but unfortunately, due to COVID-19 and travel restrictions, this did not happen. The change has given us a chance to revisit the plan and work out an even better option for collaborating with researchers and trainees at Dalhousie and Ben-Gurion Universities. Dalhousie Medical Research Foundation (DMRF) and Canadian Association of Ben-Gurion University (CABGU) have been included in these discussions and a plan is in place to partner researchers who will work on joint projects, which will see their trainees traveling between the two universities once travel restrictions are lifted.

Some initial funding is available and we are hopeful that discussions with DMRF, CABGU and MITACS will result in further funding to broaden the exchange portion of the program to up to 10 students per annum.

Another aspect to this important relationship between our universities was the completion of the joint PhD program and MOU in 2020.

DALHOUSIE INSTITUTE WORKING GROUP

Four Dalhousie institutes affiliated with the Dalhousie Medical School have been meeting this past year to better understand roles and responsibilities and to find ways to work together. The participating institutes include Beatrice Hunter Cancer Research Institute, Centre for Comparative Genomics & Evolutionary Bioinformatics, Healthy Populations Institute and the BRC. A discussion paper has been developed and it is anticipated that there will be discussions held with the Dean over the next few months.

CANADIAN BRAIN RESEARCH Strategy (CBRS) Working Group

The BRC catalyzed the development of the CBRS in 2019 by hosting the national leaders involved in the field. In fact, we were pleased to learn that this meeting led to an expanded presence from interested neuroscientists across Canada. This past year, with a CIHR grant, a new director and public relations professional were hired. The BRC is represented by Dr. Rafuse and the strategy group has met several times this year. We see this as a key platform for the benefit of our neuroscientists and we intend to continue our involvement.

BRC SUPPORTS OUR STUDENT RESEARCHERS

JOURNAL CLUBS

The Brain Repair Centre Journal Club program, previously held exclusively as in-person events, quickly adapted to an online format. All have continued to meet virtually and have maintained their previous schedules.

These neuroscience-focused Journal Clubs illustrate the breadth of research across the Dalhousie University, Nova Scotia Health and IWK Health Centre community. We are encouraged by the cross-pollination of ideas, new partnerships and opportunities to advance research and innovation and the application of new knowledge. BRC has awarded \$1000 to each of the Journal Clubs annually to support invited speakers, host meetings and continued learning. The current Journal Clubs are Atlantic Mobility Action Project, Interdisciplinary Science, Undergraduate Neuroscience, Vision Science, Acquired Brain Injury Club and Insect Super Club.

Details for all Journal Clubs can be found on the BRC's newly designed website at *brainrepair.ca/journal-clubs*.





From left to right: Dr. Ying Zhang, Natasha Breward, Delaney Henderson, Dr. Brett Dickey

THE BRC SUPPORTS OUR STUDENT RESEARCHERS

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BRAIN WAVES GROUP

The nature of gatherings changed due to the pandemic so the mechanisms for supporting graduate trainees changed too. Like many activities, we pivoted to an online format and we connected and networked in the virtual realm. We started a bi-weekly webinar-type meeting and brought alums back to share their insights and provide advice while reflecting on their own academic journeys.

Topics such as career advice, CV preparation, steps in setting up a business or lab and patent process have been discussed. Trainees expressed an interest in alternative career paths (outside of the laboratory) and alums, and others with requisite expertise, were delighted to share their experience.

As the trainees have seen value in these conversations, we are keeping it on the calendar and will reach out to many more alums and other experts in Nova Scotia and further afield.

CLUSTER EVENTS

TBI CLUSTER 2020 EVENT

The Traumatic Brain Injury retreat, held at the Inverary Resort in Cape Breton, Nova Scotia, brought together the Friedman Lab at Dalhousie and other groups working on brain injuries: The Calkin Group, (Nova Scotia Health), The UC Berkeley Group (Dr. Kaufer Lab), researchers from Leipzig, Germany (Dr. Schoknecht), Rehovot Israel (school veterinary medicine, the Shamir Group) and the Blood Brain Barrier Group from Ben-Gurion University.

The participants (attending in-person or via Zoom) presented their projects – the results of their research studies on brain injury and their plans for 2021. The range of topics crossed all fields: basic, pre-clinical and clinical research as it pertains to brain injury. These presentations highlighted the breadth and expanse of the current research being conducted in the labs. Participants were able to meet their international collaborators and review their work in progress. The trainees presented their projects to a wide audience of experts and received input and advice for the challenges they were facing.

The retreat also a provided a scientific forum to inspire ideas, share experiences and motivate creativity, which gave the trainees and participants a stronger connection to their collaborators and a better understanding of the impact of their own project. They also had the opportunity to see potential avenues for collaboration between our students in Israel, Canada, the United States and Germany.

NEURODEVELOPMENT Cluster 2020 event

The eighth annual Atlantic Regional Developmental Biology Symposium planned for June 2020 was cancelled. It was to have been hosted by Dr. Angelo Iulianella, Neurodevelopment Cluster co-lead and Dr. Tamara Franz Odendaal (MSVU).

NEURODEGENERATION Cluster 2020 Event

This event was cancelled in 2020 and is postponed to 2021.



Hamza Imtiaz, Medical Neuroscience Research Assistant, Friedman Lab



CLUSTER EVENTS

continued

MARITIMES ON THE MOVE AMAP 2020 EVENT

Following on the success of the past few Atlantic Mobility Action Project (AMAP) annual meetings, we returned to White Point Lodge in Nova Scotia in September 2020. This year, we were delighted to welcome back Primary Investigators and Trainees from University of Prince Edward Island, University of New Brunswick and Dalhousie. Presenters at the two-day conference, which was attended by a record number of guests, shared updates on their research and infrastructure at the three main Maritime universities.

Areas of research included sensory motor, molecular stress, biomechanics and engineering, neuronal circuits, spinal cord development, spinal cord injury and ALS. The trainees were encouraged to engage in the program and, ultimately, chair sessions, as well as present and organize a trainee session.

The meeting was an in-person meeting (modified slightly to allow for social distancing protocols) and for the first time we added some virtual presentations. The majority of the presentations were in person and attendees were delighted to be able to gather safely.

Previous plans to organize field trips are on hold due to COVID-19 but will be revisited in Fall 2021.

GRANTS

KNOWLEDGE TRANSLATION GRANTS

Every year the Brain Repair Centre awards peer-reviewed Knowledge Translation (KT) grants to help researchers further develop their research and innovation with the view to move them further along the path towards commercialization. Since the BRC began distributing this funding eight years ago, the KT grants have helped researchers leverage an additional \$10 million in funding.

In March 2021, the BRC awarded \$89,353 in KT grants to three projects. The awards went to:

INVESTIGATOR	PROJECT TITLE	AMOUNT AWARDED
Dr. George Robertson	Development of an intranasal nanoparticle formulation of IRX4204 designed to promote functional recovery in multiple sclerosis by stimulating CNS repair mechanisms	\$ 29,978
Dr. Aaron Newman	A speech recognition-based app for aphasia rehabilitation	\$ 29,975
Dr. Jamie Kramer	Development of humanized fly models for neurodevelopmental disorders	\$ 29,400

RESEARCH, DISSEMINATION & COMMERCIALIZATION (RDC) GRANTS

The BRC RDC program supports events and meetings that contribute to the dissemination, exchange and commercialization of research and innovation aimed at improving brain and neurological health outcomes for Nova Scotians and Canadians. The main objective of this funding opportunity is to enhance the international reputation of the Halifax neuroscience community by supporting local events and meetings that will attract international, national and local participants and, as a result, highlight intellectual property (IP) for potential investment opportunities in Nova Scotia.

The 2020 RDC grant has been deferred due to the fact that the award is for an in-person meeting. As soon we are able to hold in-person meetings of this nature, there will be a call for an RDC grant.

INTELLECTUAL PROPERTY PROGRAM MENTORING PILOT

After several years of providing KT grants at the BRC, we learned that our Principal Investigators would benefit from expertise in the field of Intellectual Property (IP). A pilot program was launched and, if we determine that PIs are making progress in terms of understanding and/or acquiring IP, we will consider making it more permanent in 2021-2022. We are pleased to have had access to individuals with expertise in neuroscience at the PhD level, combined with Intellectual Property law and patent agent expertise. Initially, the program is intended for KT grant recipients. This program was initiated in March 2021 and we plan to evaluate results of the pilot later in 2021.

COMMUNICATIONS

Greater focus on our online communications gave us a chance to revisit and refocus our communications strategy. With some assistance from our partners at Plum Group, the result is a new-look website that better tells our story. It contains interviews, photos, videos, and new messaging about who we are and what we do. In addition, it has a more updated look and feel, and will better equip the BRC to use social media platforms to share relevant information, highlight the work of the BRC and engage with our stakeholders. Going forward, Plum will also assist with stakeholder engagement, strategic planning and video production.



This year, we also participated in a campaign published in *Macleans* magazine called Understanding Neurological Conditions. A print version was available at newsstands and the digital version can be accessed via the BRC website News page or by following this link: <u>Brain-Related Research Helps People</u> <u>to Live Better</u>.

BRAIN AWARENESS WEEK

Brain Awareness Week 2020, scheduled to be held March 23 to 27, 2020, was the first event to be cancelled due to the pandemic. As it is usually planned many months in advance, it was decided in late 2020 to move to a virtual event in 2021.

The main event of 2021 event was not the usual Brain Fair, instead it was a competition for schoolaged kids. Children from all over Nova Scotia were invited to enter a competition for a chance to win a neuroscience-themed prize pack. Primary to grade 2 students were provided with brain-related colouring images, designed by BRC trainee, Dylan Deska-Gauthier; grades 3 to 5 were invited to create a neuron from pipe cleaners/modelling clay (an activity that has been a part of BAW for many years) and students in grades 6 to 8 and 9 to 12 were invited to make a neuron from items found around the house. Submissions were electronic photos of their creations and the winning students were from the following schools:

- P-2: Sacred Heart School of Halifax
- 3-5: St Catherine's Elementary
- 6-8: St Catherine's Elementary
- 9-12: Halifax West High School

The winning images can be viewed at www.hfxbaw.org/neuron-competition-winners/

The annual Brain Bee was cancelled in 2020 and is planned to go ahead in June 2021 as a virtual event. Details of this competition for high school students, who can earn a place in the National Brain Bee, held at McMaster University, were confirmed just before this report was produced. The BRC will be working with universities across Canada to present the event. The Brain Bee will be collaborative in nature, although each province will have their own competition, with provincial winners competing for a place representing Canada at the International Brain Bee competition.

The BRC continued to work with local societies and students to increase awareness of brain-related research. The annual Neuroscience as Art competition, which raises funds for charity, was run during Brain Awareness Week 2021. The winning pictures from the 2020 and 2021 events were sold via online auction, raising almost \$400 for a local charity, The Healthy Minds Cooperative.

In addition to the usual events, the 2021 BAW website included a virtual Learning Library. Undergraduate trainees worked hard to produce videos, a BRC laboratory tour and podcasts, all of which are posted to the BAW website <u>www.hfxbaw.org</u>.

Our COO, Diana Nichols Nelson, was interviewed on Global TV and CTV to promote the events.

2021 Neuroscience as Art winners:

Danielle Stanton-Turcotte, Department of Medical Neuroscience, lulianella Lab (1st place – shown on cover); Dylan Deska-Gauthier, Department of Medical Neuroscience, Zhang Lab (2nd place – shown on inside front cover); Heather LeBlanc, Faculty of Arts and Social Sciences (3rd place – shown on next page)

VISION FOR THE FUTURE



SUSTAINING AND FUELING OUR FUTURE

The past year has been filled with many unknowns but as we look towards the future and a world with fewer restrictions, the way we conduct our research may not have us returning to the past. Being forced to reimagine our processes and a greater reliance on technology has proven that we can continue, and even improve, our work in most BRC programs.

This past year, we engaged many trainees in our newly formed Brain Waves Group, reconnected with alumni, brought new training type seminars to our members, hosted Brain Awareness Week and successfully ran our KT grant competition, to list but a few accomplishments. As the research is re-established, we have prepared the groundwork to ensure that we profile the important work and the contribution of our researchers through our new website and our social media channels and we will continue to seek opportunities for outreach and media relations.

We anticipate that as we experience a full resumption of research and productivity, we will be poised to increase our capacity at the BRC to promote, advise, train and offer grants and stipends to our members. A priority will be to grow the staff and budget of the BRC. This will be achieved primarily through donations.

There is a better understanding of the critical importance of research due to the pandemic. The COVID-19 neurologic symptoms and the ongoing neurological diseases and disorders requiring further insight make our work more important than ever.

APPENDIX A: LEVERAGED FUNDING FROM KNOWLEDGE TRANSLATION GRANTS

The following is a list of subsequent funding, which BRC members have leveraged in 2019/20, following receiving a KT grant.

SHAUN BOE		
NSERC Discovery	\$ 279,018	(6 yrs)
GAIL ESKES		
InNOVAcorp Early Stage Commercialization Fund – 2021-2022 Nova Scotia Health Translating Research into Care (TRIC)	\$ 50,000	
Healthcare Improvement Research Program – 2020-2022	\$ 59,771	(2 yrs)
Dalhousie VPRI International Seed Fund	\$ 10,000	-
GEORGE ROBERTSON		
Dalhousie Department of Psychiatry Research Award	\$ 20,000	(2 yrs)
JOHN FRAMPTON		
CIHR/NSERC Collaborative Health Research Projects (CHRP)	\$ 983,412	(3 yrs)
KEIT Strategic Industrial Technology R&D Program	\$ 290,510	
Nova Scotia COVID-19 Coalition	\$ 50,000	
NSERC Research Tools and Instruments	\$ 150,000	
InNOVAcorp Early Stage Commercialization Fund – Phase II	\$ 50,000	
SULTAN DARVESH		
DMRF Gillian's Hope for MS Research Fund	\$ 150,000	(3 yrs)
STEVEN BEYEA		
IWK Health Centre	\$ 25,000	
MICHAEL SCHMIDT		
Nova Scotia Health Translating Research into Care (TRIC)	\$ 59,771	(2 yrs)
SEAN CHRISTIE		
Dalhousie University, Operating Grant	\$ 49,122	
ALON FRIEDMAN		
The Crown Foundation, Operating Grant	\$ 800,000	
YING ZHANG		
Plum Foundation	\$ 40,000	(2 yrs)
CIHR Project Grant	\$1,009,800	(5 yrs)
TOTAL	\$4,026,404	

Researchers have reported grants totalling \$17,335,801 since the BRC began awarding Knowledge Translations grants in 2013.

APPENDIX B: FINANCIALS 2020-2021

EXPENSES

ACTUAL

PAYROLL	Payroll + Benefits	\$	126,798
OPERATIONAL EXPENSES	Training & Office Supplies	\$	2,424
	Filling Equipment Purchase	¢	_
	Equipinent Fulchase	¢	_
	Meetings – general	¢	
		φ φ	2,343
	Utilities	ý	1,282
CONFERENCES	Travel & Registration	\$	_
	Cluster Conferences	\$	22,945
	Promotional	\$	3,220
	BAW	\$	6,348
EXTERNAL CONTRACTORS	Communications Design Research	¢	23 /100
	Grant Review Committee	Ψ \$	1 600
	KT Consulting	¢	7 500
	KI Consulting	φ	7,300
STUDENT AWARDS	Summer Student Scholarships	\$	_
	Travel Prizes	\$	-
SEUNSUBSHIP	Societies	\$	5 000
	Promo itoms	¢	521
		φ	551
GRANTS	KT Grants	\$	89,353
TOTAL EXPENDITURE		\$	292,834

INCOME

TOTAL INCOME	\$ 316,082
LAE	\$ 250,000
DAL	\$ 65,000
QEII	\$ 1,082

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