



The Canadian Brain Research Strategy: A Focus on Early Career Researchers

Caroline Menard , Tabrez J. Siddiqui, Derya Sargin, Ashley Lawson,
Yves De Koninck, Judy Illes 

doi:10.1017/cjn.2021.81

Can J Neurol Sci. 2022; 49: 168–170

THE CANADIAN BRAIN RESEARCH STRATEGY (CBRS)

The Canadian Brain Research Strategy (CBRS; canadianbrain.ca), a grassroots initiative that has been building since 2015, reached a turning point in June 2020 with federal financial support from the Canadian Institutes of Health Research to formalize its network infrastructure and strategic activities. The early Canadian team was part of the 14-nation group that co-signed, in 2016, a G-Science Academies Statement on Understanding, Protecting, and Developing Global Brain Resources, emphasizing that “... *the human brain as civilization’s most precious resource and placing investment in brain science as an investment in the future of society*...” The statement further called for a concerted effort to achieve the goal of overcoming the bottleneck of developing the required technologies “... *to study the brain at a resolution sufficient to enable understanding of its complex neuronal network in animal models and humans*” (National Academies 2016). Following suit, in 2018, Canadian researchers representing the CBRS joined researchers from the USA, Europe, Japan, Korea, China, and Australia to provide leadership to the International Brain Initiative (IBI; internationalbraininitiative.org) with the mission to “... *catalyze and advance ethical neuroscience through international collaboration, knowledge sharing, united ambitions and the dissemination of discoveries*”¹. The simple subtitle of the Declaration of Intent to Create the IBI initiative provides its foundational concept: “*It takes the world to understand the brain*”. In this spirit, the CBRS today seeks to anticipate and fuel innovations that expand global boundaries of knowledge and technology, and drive the development of new tools, including artificial intelligence. It relies on ethical frameworks for culturally respectful design and meaningful dissemination of neuroscience research and has, at its core, a priority to build capacity among Canada’s future leaders in the neurosciences – today’s Early Career Researchers (ECR) – and on whom we focus here.

As the CBRS plan leans on a strong legacy of and commitment to Canadian neuroscience, it finds its grounding in a question fundamental to humanity: *How does the brain learn, remember and adapt?*². The plan has four pillars – Understand, Address, Build, and Apply – and five tightly intertwined organizational components (see Figure 1 in Illes et al.²) that emphasize the importance of:

1. Accelerating the understanding of the brain and translation to clinical treatments that address grand challenges in the brain and mental health for Canadians.
2. Increasing collaboration, data sharing as well as technology development and dissemination among Canadian researchers and building on collective strengths.
3. Identifying targets and milestones for strategic and coordinated investment in Canadian neuroscience and mental health.
4. Training the next generation in interdisciplinary brain research and bridging diverse disciplines spanning the physical and computational sciences, law, sociology, and economics.
5. Developing meaningful collaborations with other initiatives on the international stage.

For three of the pillars of CBRS – Understand, Address, and Build – ethical considerations are implicit, encompassing both simple and complex phenomena that include, for example, the responsible conduct of research, limiting the numbers and suffering of animals in research, respecting persons and protecting their autonomy and rights, data, and privacy protections, and anticipating both beneficial and consequential outcomes.² The Apply pillar recognizes the explicit imperative of the CBRS to promote individual and societal well-being, and evidence-based informed social and health policy, and education. This will be achieved by developing and promoting best practices in early childhood education, a rapprochement between the fields of

From the Department of Psychiatry and Neuroscience, Université Laval and CERVO Brain Research Centre, Quebec City, Canada (CM, YDK); Kleysen Institute for Advanced Medicine, Health Sciences Centre and Department of Physiology and Pathophysiology, University of Manitoba, Winnipeg, Canada (TJS); Department of Psychology, Hotchkiss Brain Institute, Alberta Children’s Hospital Research Institute, University of Calgary, Calgary, Canada (DS); and Neuroethics Canada, Division of Neurology, Department of Medicine, University of British Columbia, Vancouver, Canada (AL, JI)

RECEIVED DECEMBER 23, 2020. FINAL REVISIONS SUBMITTED APRIL 16, 2021. DATE OF ACCEPTANCE APRIL 16, 2021.

Correspondence to: Judy Illes, CM, PhD, Canada Research Chair in Neuroethics, Professor of Neurology, Department of Medicine, Director, Neuroethics Canada, University of British Columbia, 2211 Wesbrook Mall, Koerner S124, Vancouver, BC V6T 2B5 Canada Email: judy.illes@canadianbrain.ca; Yves De Koninck, PhD, Canada Research Chair in Chronic Pain and Related Brain Disorders, Professor Department of Psychiatry and Neuroscience, Université Laval, Director, CERVO Brain Research Center, Quebec City, QC, Canada. Email: ydk@canadianbrain.ca



Figure 1: Key areas of discussion in CBRS early career workshops.

psychiatry and neurology,³ managing unexpected findings in research and clinical medicine that can pose unique human rights challenges, and navigating open science approaches in neurosciences (Canadian Open Neuroscience Platform; comp.ca) and intellectual protections.⁴ All told, for neuroscientists across Canada, both the challenges and opportunities are immense.

BUILDING CANADIAN CAPACITY AND LEADERSHIP

In late 2020, we gathered 48 ECRs from across the country, nominated by CBRS research leaders, to participate in 1 of the 2 launch online workshops. Most were at the assistant professor level, balanced for gender, at the time of the workshops; a few were recently tenured or promoted to the associate professor rank. Our goals were to initiate a discussion to: (1) identify attributes of Canadian neuroscience that stands out for them, and (2) define how the CBRS can best leverage and build on Canadian strengths to promote the leadership potential of this up-and-coming cohort. We transcribed the 3hrs of recordings, entered the text into NVivo (QSR 11), and used the word frequency function of the program to generate a word cloud of top areas of interest (Figure 1). Across the CBRS pillars, five were prominent: collaboration, inclusiveness, access, transdisciplinarity, and training.

Collaboration

Collaboration was identified as one of the greatest strengths of the Canadian neuroscience community and a critical factor in facilitating innovation and success. In fact, participants described the collaboration as a critical driving factor for pursuing their careers in Canada. They spoke about pursuing leadership roles to promote collaborations both nationally and internationally, and to bridge basic and clinical science. They considered the requirement for new platforms aimed at bringing people together with the opportunity to discuss science and foster collaborations. In particular, they highlighted the opportunities afforded by new platforms for large team grants where the model of single or limited leadership is replaced by a model that embraces different researchers, especially ECRs, who are able to lead “different ideas of the same story”. To promote this strength, CBRS is creating a repository of major Canadian brain initiatives that will document respective goals and priorities and highlight opportunities for leverage where redundancies exist. In the second phase of this mapping

project, the CBRS will expand the resource to include advocacy and philanthropic groups, further offering a resource database for partnership opportunities across multiple sectors.

Inclusiveness

ECRs emphasized that the CBRS should be inclusive for people of all geographic, cultural, and disciplinary backgrounds, and use the broadest definition of neuroscience to embrace this goal. In this context, they emphasized the importance of recognizing diverse but complementary research principles, methods, goals, and even approaches to knowledge translation. Current efforts by the CBRS to understand the landscape of gaps in inclusiveness today (Illes et al., EDI in neuroscience: The data needed for course correction, in preparation), particularly with respect to Indigenous, Black, and other minorities, ECRs and trainees, will set the stage for dedicated programmatic initiatives in capacity building in graduate education, outreach to youth, and career mentoring.

Access

Access to new platforms that allow for open discussions and data sharing are critical to the future of ECRs in neuroscience. ECRs recognized that substantial high-quality data are being gathered across the Canadian universities and institutes today, but highlighted that better data coordination strategies at the national level are necessary to help position Canada internationally as a leader in open science. They also emphasized the importance of access in the context of the role that the CBRS has in training and facilitating for them opportunities for public engagement, raising awareness of neuroscience through mainstream and social coverage, and attracting new funding. These goals will be achieved by reinforcing and growing the important relationship of CBRS with the science journalism community to bolster public awareness, and through communication skills training for CBRS researchers.

Transdisciplinarity

ECRs emphasized that cutting-edge research is important for career advancement, while acknowledging the complexities involved in weaving together and navigating different facets of research in neuroscience. They appreciate having been trained in an environment where transdisciplinarity is embraced and increasingly recognized as a requirement and necessary for innovation. The Strategic Innovation Fund (<https://www.ic.gc.ca/eic/site/125.nsf/eng/home>) and the New Frontiers in Research Fund (<https://www.sshrc-crsh.gc.ca/funding-financement/nfrf-fnfr/index-eng.aspx>) are two avenues through which transdisciplinarity can be realized on a federal level. By creating opportunities for trainees to collaborate with industry professionals through partnerships with organizations such as MITACs, CBRS will also promote a more diverse approach to neuroscience research.

Training

Canada is in an advantageous position to recruit excellent trainees into neuroscience labs and, for ECRs, increasing the pool of outstanding trainees is imperative. Moreover, intersecting with the increasing demand for transdisciplinarity, current undergraduate and graduate programs must be revised and updated to

support the efforts of Canadian ECRs to recruit young and motivated trainees to their laboratories. ECRs also noted the urgent need to increase the availability and duration of financial support for graduate students and postdocs to stay and pursue their research within Canada. Sustainability of funding for international students brought to Canada through competitive programs, but who then lack the funding to complete their programs, is a major concern. As ECRs noted, Canada must remain “a great location to go for training”. To maintain and further advance Canada’s reputation in this regard, the CBRS will promote and support cross-industry collaboration, intersectoral training, and advocate for specialized funding for teams consisting of researchers with different levels of experience.

CONCLUSIONS

Thinking about the CBRS within the framework of understanding how the brain works as a fundamental goal of neuroscience research, ECRs discussed how research is the engine of discovery of new treatments and cures for diseases of the brain, and changes in approaches to brain and mental health. ECRs expressed their appreciation of the strength of Canadian neuroscience research that is rooted in a collaborative and inclusive transdisciplinary approach that allows Canadian neuroscientists to work together in ways previously unimagined.

The CBRS will move forward vigorously to build a new kind of neuroscience community for Canada and indeed, as we envision it, a neuroscience-inspired nation (canadianbrain.ca/proposal). The need could not be more urgent: the massive burden of brain disorders is growing in Canada. In stark contrast to cardiovascular disease, for example, for which heart attacks in Canada have dropped more than 75% in the last 60 years, progress is still slow in treating a range of brain disorders. This pace underscores the immense need for increased basic and translational knowledge and practice for brain disorders across the lifespan such as autism, Alzheimer’s, substance abuse, and depression with no known cures. It is these grand challenges and opportunities that the CBRS seeks to tackle through an unprecedented effort and with its focus on ECRs. Canadian neuroscientists follow in the footsteps of historical giants such

as Wilder Penfield and William Osler and many others such as Hans Selye, Donald Hebb, and Brenda Milner on the east coast, and Juan Wada and Frank Turnbull on the west.⁵ Today’s generation of leaders are poised and already paving the way for the next one. The CBRS provides the scaffolding to fully realize the dreams and immense potential of Canadian neuroscience and neuroscientists ahead.

ACKNOWLEDGMENTS

We thank Ari Rotenberg for the word cloud analysis, and Marianne Bacani for her contributions to this work.

FUNDING

The Canadian Brain Research Strategy Secretariat and its participation within the International Brain Initiative is supported by a Network/Catalyst grant from the Canadian Institutes of Health Research (CIHR) to YDK, JI, and CM (Grant #171583;03027 IC-127354). JI and YDK are supported by the Canada Research Chair Program and CM is supported by a Sentinel North Chair (Canada First Research Excellence Fund).

STATEMENT OF AUTHORSHIP

CM, TJS, DS, YDK, and JI wrote the manuscript with AL contributing to the revisions. All authors commented and edited the final version of the manuscript and figures.

REFERENCES

1. International Brain Initiative. International Brain Initiative: An innovative framework for coordinated global brain research efforts. *Neuron*. 2020;105:947.
2. Illes J, Weiss S, Bains J, et al. A neuroethics backbone for the evolving Canadian Brain Research Strategy. *Neuron*. 2019; 101:370–4.
3. Anderson JA, Eijkholt M, Illes J. Neuroethical issues in clinical neuroscience research. *Handb Clin Neurol*. 2013;118:335–43.
4. Roskams-Edris D, Anderson-Redick S, Kiss ZH, Illes J. Situating brain regions among patent rights and moral risks. *Nat Biotechnol*. 2017;35:119–21.
5. Jasper HH. The early development of neuroscience in Canada. *Can J Neurol Sci*. 1985;12:221–9.