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Written Submission for the Pre-Budget Consultations in Advance of the 2023 Federal Budget

Investing in science to create new jobs and build a greener,
more competitive, innovative, inclusive, and resilient future for
Canada.

By: The Canadian Association for Neuroscience

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The Canadian Association for Neuroscience recommends the following:

Recommendation 1: That the government of Canada increase investments in the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC) and the Social Sciences and Humanities Research Council (SSHRC) for the benefit of all Canadians. We urge the government to adopt a **four-year plan to double the budgets of the three main federal funding agencies (CIHR, NSERC, SSHRC) starting with a 25% increase in the next budget.** This recommendation aims to bring Canadian investment in scientific research to a level commensurate to that of other G7 countries.

Recommendation 2: That the government of Canada increase its support for graduate students and postdoctoral fellows by **50% for graduate scholarships and postdoctoral fellowships** to increase both value and number awarded in the next budget. In conjunction with recommendation 1, this recommendation will ensure our next generation of scientists have the means to participate fully in Canada's knowledge economy.

Recommendation 3: That the government of Canada make **research on the Brain and Mental Health a national priority** by investing in research to understand the brain through well-established and trusted organizations in the field.

Increased funding for fundamental research will make Canada ready to face existing and new challenges.

Fundamental research is key to informing our response to new challenges and building resilience. The pandemic best illustrated this - if you received the Pfizer COVID-19 vaccine, you received a vaccine that uses lipid nanoparticle technology that was developed right here in Canada. But this didn't happen over night. The crucial research required 40 years of curiosity-driven research lead by Dr. Pieter Cullis, Professor at the University of British Columbia. This is just one success story out of hundreds, and made possible only because of past long-term investments in fundamental non-targeted research in Canada.

Fundamental research drives innovation. New ideas to meet the most complex challenges to our health and society, such as those posed by climate change and pandemics depend on our commitment to supporting fundamental research.

In addition to providing solutions for a greener and healthier Canada, our researchers contribute to addressing critical challenges and opportunities that Canada faces, including:

- **Brain and Mental Health issues**, which are among the most complex to understand, but also the most important to address –The burden of brain disorders and diseases has substantially increased over the last 25 years with the ageing of the population and is increasing further due to Post-COVID19-Condition (PCC). Half of world's population will be diagnosed with a brain disorder over the course of their lifetime. This is having a detrimental impact on the economy, healthcare systems, and Canadian livelihood. **Neurodegenerative diseases are the leading cause of disability and the second leading cause of death worldwide¹.** Mental health disorders are the leading cause of days off work. Through their research, Canadian neuroscientists work tirelessly to identify cures and therapies for Canadians who live with diseases and conditions.

¹ (Feigin et al. Lancet Neurol. 2019;18(5):459-480. doi:10.1016/S1474-4422(18)30499-X)



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- **Maintaining Canada's Competitiveness and Leadership in the World** – Canada's scientists have historically been known to produce above expectations and are recognized leaders in many fields of brain research including autism, memory, sleep, pain, artificial intelligence, and spinal cord injury. However, it is difficult for Canadian scientists to remain competitive and for Canada to attract new talent as the disparity in research support with other G7 countries continues to widen.
- **Creating Good Jobs for Canadians** – Investing in scientific research leads to the creation of jobs for highly qualified personnel (HQP) not just within research laboratories but across varied industry, government, and the public sector. Our trainees play key roles in medical and high-tech companies in Canada, who are looking to fill competitive job opportunities.
- **Diversifying and Strengthening Canada's Economy** – The world is moving towards a knowledge and innovation economy, in which Canada has the potential to lead. *Made-in-Canada* discoveries are the foundation for innovation that supports a stronger and more diverse Canadian economy.

Increasing support for fundamental research now is an investment in **scientific readiness and resilience**, allowing Canada to be prepared to face new challenges and lead on the global stage. We don't know where the next great discovery will come from and diversity in investment across science in Canada will, just like investment portfolios, increase return on investment.

Canada is falling behind in science funding – now is the time to act

Canadian scientists work for all Canadians. Their discoveries fuel the innovation economy, and their laboratories train highly qualified personnel who contribute to diversifying the Canadian workforce. Yet **Canada is falling behind in science funding when compared to other countries.**

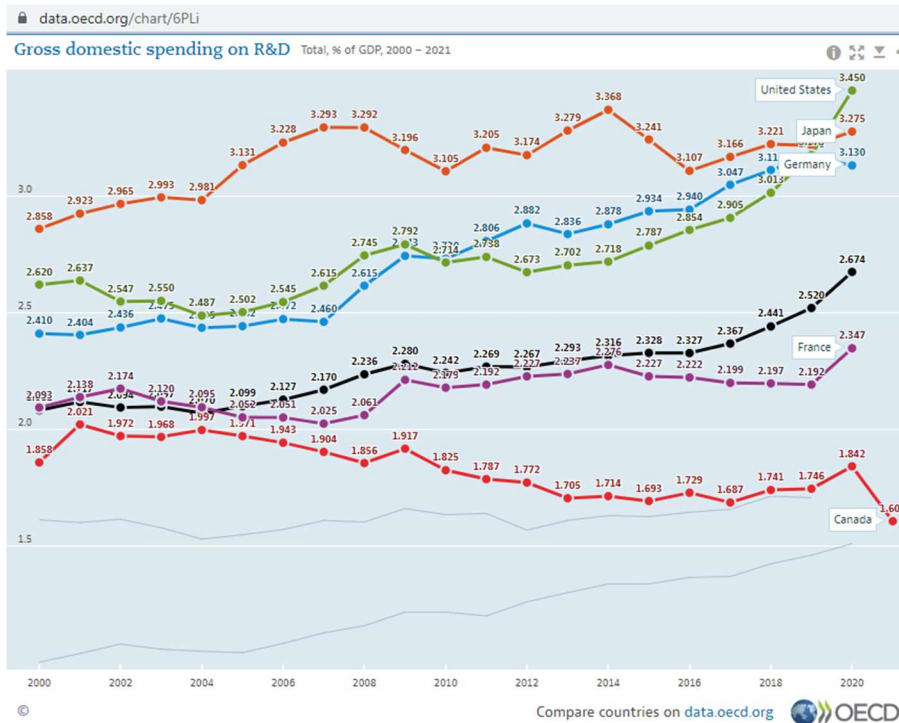
According to the latest data from the OECD (Organisation for Economic Co-operation and Development <http://www.oecd.org/>) Canada is the only country in the G7 whose



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investments in Research and Development have **steadily declined over the last 20 years.**



OECD Data on gross domestic spending on Research and Development - Canada compared to other countries of the G7.²

Canada now ranks second to last among G7 countries in terms of gross domestic spending on Research & Development (R&D), with only 1.6% of its GDP invested in R&D. This comparatively low investment level places Canada below the average of 2.7% for OECD countries and well below the United States (3.4%), and other non-G7 countries with fast-growing economies such as South Korea (4.8%) and Israel (5.4%) with respect to gross domestic spending in R&D.

We recognize that government investment in R&D is only a proportion of the total R&D investment in a country. However, research shows that government investment is multiplied by private investments, leading to a much higher return on investment. Many countries have recognized this, including Japan, Germany, and the United

² (Accessed on 10 October, 2022 Chart permanent URL: <https://data.oecd.org/chart/6PLI>)



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States. Looking to our American counterparts, in May 2021, the US increased their science budgets, including a 21% increase to the National Institutes of Health (NIH)³, the American equivalent of CIHR. The NIH's 2021 budget was \$45 billion USD (approx. \$62 billion CAD), compared to CIHR's \$1.44 billion CAD). **This represents a 43-fold difference in funding support for CIHR**, which contrasts with the nine-fold difference in population between the United States and Canada.

Canada has much to lose by not supporting our scientists. The competition is strong, and even if Canada's quality of life is enviable, high caliber researchers are attracted by the much higher financial means available to them in the United States, and other countries. If Canada does not increase its support for science, the **reality of the brain drain** will continue to worsen.

This was recently brought to light in an in-depth report on Radio-Canada/CBC, on January 22, 2023, which reported:⁴

"Canada's basic research sector has had a serious funding problem for two decades. Justin Trudeau's Liberal government promised back in 2015 to fix this, but many scientists are finding that funding for cutting-edge research is still stagnant or declining. This situation, if it continues, could significantly undermine Canada's competitiveness in the international research and development sector." – Journalist Frank Desoer in discussion with scientific experts

A key to making Canada's workforce more inclusive: providing adequate funding for researchers at all career levels.

Canadian neuroscience laboratories that perform fundamental research rely heavily on funding provided by the Canadian government through Tri-Agency (CIHR, NSERC, SSHRC). Canada's research funding agencies have put in place important assessment and reporting tools to ensure that our research funding ecosystem is inclusive.

³ <https://www.sciencemag.org/news/2021/05/biden-seeks-big-increases-science-budgets>

⁴ <https://ici.radio-canada.ca/ohdio/premiere/emissions/desautels-le-dimanche/segments/chronique/429798/scientifiques-recherche-nouveaux-fonds-canada-frank-desoer>

However, lack of adequate funding results in funding inequities, notably for graduate students, who receive funding below the poverty line as their supervisors cannot afford to pay them more.

Project grants awarded by the CIHR are the core funding mechanism for biomedical research in Canada. Unfortunately, the success rates for funding applications at CIHR have declined since 2005, from a 33% success rate to close to 19% in 2021 (less than one in five successful applications), leading to financial insecurity for laboratories. Current success rates are too low to maintain a diverse and flourishing research environment, as most excellent research projects go unfunded. Researchers spend months preparing and writing grant applications, while their chances of being successful are too low to be sustainable. It should also be noted that the current funding level is only achieved by making drastic cuts to the budgets of all funded project grants – 23.5% in the last few years - further highlighting the lack of sufficient funding for this critical mechanism to support Canadian research.

A survey from 2016⁵ has identified *research funding issues* and *insufficient funds to attract and retain highly qualified personnel* as the top two greatest impediments to research in Canada. This is still the case today.

Most research projects are long-term endeavours. Loss of funding for even a single year due to the highly competitive funding situation causes major setbacks for researchers leading to the loss of HQP that cannot easily be replaced. Some laboratories do not recover, and end up closing, or moving to other countries.

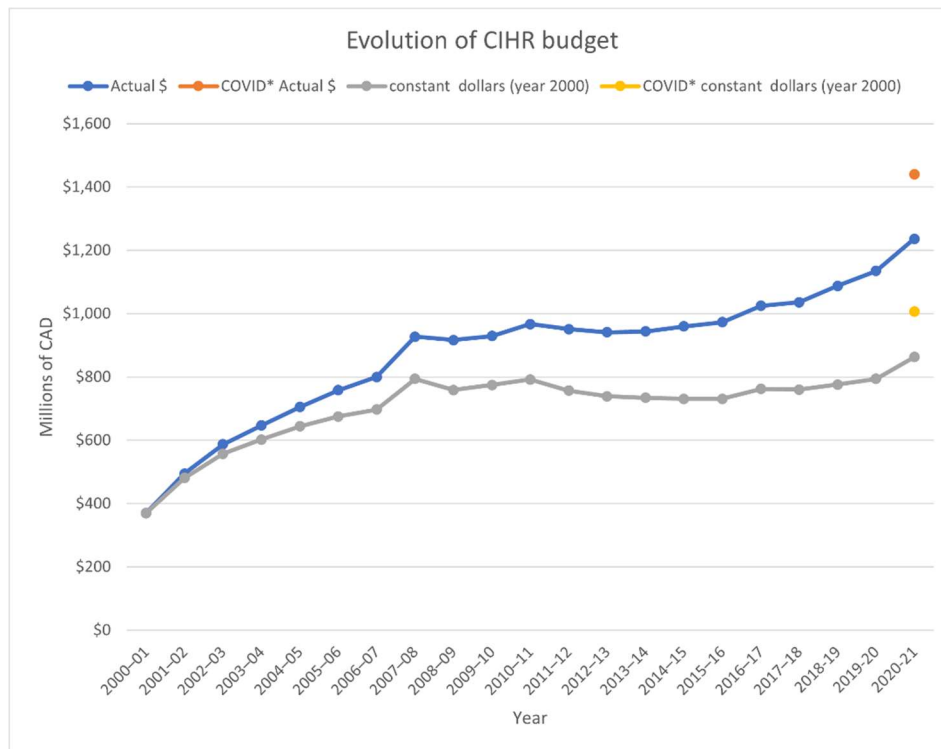
The **stagnation in the CIHR budget between 2006 and 2023 is costing research and discovery**. The budget for CIHR in 2007-2008 was \$927M and planned spending for 2020-2021 was \$1,236M. While this represents an increase in actual dollars, it represents only an 8.7% increase over 14 years when inflation is considered (adjusting to constant dollars by using the Bank of Canada inflation calculator). Moreover, application pressure has increased (3850 applications in 2006 vs. 4395 in 2021), and the cost of experimental materials has increased at a rate higher than inflation. Canada's reputation as a leader in science is at stake: to attract emerging leaders in the field and also retain our scientists, support for science and research needs to grow.

⁵ https://galealab-psych.sites.olt.ubc.ca/files/2016/11/CIHR-Survey-Report_Final.pdf



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- Millions \$CAD
- Adjusted for inflation
- Millions \$CAD including COVID-19 dedicated funds
- Funds including COVID-19 dedicated funds – adjusted for inflation

Graph data source:

<https://can-acn.org/science-funding-in-canada-statistics/>

Funding for graduate students – often below the poverty line

Canada has established mechanisms for supporting the training of the next generation of researchers through the Canada Graduate Scholarships program. However, trainees that successfully compete for a scholarship (i.e. Master's program; CGS-M), receive a \$17.5K CAD per year, an amount that has not kept up with inflation and that has been stagnant since 2003. This is below the low-income level cut-off of \$22K CAD for a person living alone in a major Canadian city. The NSERC website states that *"This support allows these scholars to fully concentrate on their studies in their chosen fields"*. This is no longer accurate, and disheartening for students, who must now face rising housing costs and inflation rates. Paying students a living wage is the base for equity, diversity and inclusion, and an essential requirement if we are to attract the brightest minds from diverse backgrounds and not only those who are independently wealthy.

As two of our student members from Ontario commented:



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I am the recipient of a CIHR Canada Graduate Scholarship (amount received is \$17,500). This amount of money, in addition to the amount I get as a research assistant, would not be enough money to pay for my expenses and to live comfortably if I lived on my own. Thankfully, I live with my parents. If I didn't, I would need a part-time job to further support myself, which would take time away from my research and master's program studies. I think more government funding is absolutely necessary to support graduate researchers.

As an NSERC PGSD holder who also receives additional funding I cannot imagine a student being in the position of relying solely on a PGSD award for PhD funding, particularly considering that doctoral degrees almost always run longer than the duration of the award and that the fixed value of the award leaves students particularly vulnerable to inflation risk. Even with additional funding sources my current compensation falls somewhere between 25% and 33% of that earned in industry by other students from my previous (computational) degrees who are doing similar work.

Currently, academia is viewed as an uphill battle, with no clear indication that the situation will improve, which is a daunting prospect for trainees.

Decisive action is needed now. We recommend that **funding for Canada Graduate Scholarships be increased by 50% in the next budget, and that it be indexed to inflation afterwards**. This investment would allow Canada to retain its brightest minds and to attract new talent. Without it, our scientists will find it more favourable to bring their talent elsewhere.

Funding fundamental research can lead to lifesaving therapies

While most people recognize how fundamental research was key to the development of the COVID-19 vaccines, it is important to keep in mind that research performed in Canada has the potential to improve and save lives of individuals from many diseases. One very recent example, reported on CTV News, showed how Canadian doctors performed the world-first delivery of treatment for an inoperable brain tumour in a child using ultrasound⁶. This incredible feat was possible by groundbreaking research done at the Sunnybrook Research Centre and the Sick Kids Hospital in Toronto using a novel focused ultrasound technology to deliver drugs

⁶ <https://www.ctvnews.ca/health/canadian-doctors-perform-world-first-delivery-of-treatment-for-inoperable-brain-tumour-in-kid-using-ultrasound-1.6225776>



across the blood-brain barrier. Moreover, this innovative approach allows for drugs to specifically reach affected areas of the brain, offering hope for patients with inoperable, and often terminal, brain tumours.

Closing remarks

Canada must invest in fundamental research to secure its position as a scientific leader in the world, and to support a knowledge-based economy that is prepared to face future challenges. Furthermore, brain diseases and disorders are amongst the most important challenges facing Canadians today.

We propose a bold, but timely and feasible plan for Canada:

- Doubling the budgets of all three Canadian science funding agencies – CIHR, NSERC, SSHRC over four years (starting with a 25% increase in the next budget), to support the Canadian science ecosystem.
- 50% increase in support for Canada Graduate Scholarships in the 2023 budget, to ensure support for the next generation of researchers.
- National prioritization of brain and mental health research and increased investment in major initiatives to understand the brain through trusted organizations in the field.

We have much to gain by supporting our scientists, who are motivated and already working hard for Canada. The time for decisive action is now to provide the critical resources necessary to maintain our global competitiveness in science and research and to ensure we are fully prepared to confront existing and new challenges.

About the Canadian Association for Neuroscience

We are the largest association of neuroscientists in Canada, with over 1000 members dedicated to advancing brain research.

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