



# Increased investment in scientific research: An investment in the health and prosperity of Canadians today and tomorrow

Written Submission for the Study on Successes, Challenges and Opportunities for Science in Canada for the Standing Committee on Science and Research.

By: The Canadian Association for Neuroscience

The government of Canada must significantly and predictably 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.

***Rationale:***

A- Increased investments are required for research restart and recovery from the setback of the COVID-19 pandemic to research laboratories in Canada.

The government of Canada rapidly responded to the COVID-19 pandemic by providing funds to support COVID-19 research, as it recognized the importance of science to inform our response to the pandemic. These funds have allowed Canadian researchers to make meaningful discoveries that will be of crucial importance for Canada's recovery from COVID-19. Scientists have been at the forefront of public information campaigns; have contributed to identifying new testing methods; have investigated new potential COVID treatments; and worked to break down barriers to communication with indigenous and underrepresented groups, among other contributions.

While investments in COVID research must be applauded, **it is important to note that most health research is focused on non-COVID diseases.** COVID has had an important impact on research laboratories in Canada<sup>1</sup>. Due to the pandemic, most research laboratories were shut down for a minimum of three months and are still not operating at full capacity over a year later, causing a tremendous setback to Canada's research ecosystem. As labs were closed, they could not hire and train students, post-docs and staff to perform experiments, leading to a loss of highly qualified personnel and of research materials developed during long-term experiments (multi-month and even multi-year projects). Researchers and trainees have also lost funding opportunities. Most labs have significant ground to make up just to get to where they were pre-COVID. Setbacks like these are bad for Canadians because they will delay or prevent the critical research and scientific discoveries that lead to innovation, new medicines, and therapies.

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

**As COVID-19 has shown, fundamental research is key to facing new challenges.** One such example, and a Canadian success story, is that of Dr. Pieter Cullis, Professor at University of British Columbia who has had a long-standing career studying lipid nanoparticles, which is a technology that wraps mRNA in a type of bubble so that we can safely inject it into humans. He started working on this back in 1995, firmly believing that one day this technology could be important for delivering therapies to patients. Along the way, he established collaborations with companies around the world, including BioNtech, a company in Germany that worked with Pfizer to generate one of the COVID-19 vaccines. If you received the Pfizer vaccine, you received a vaccine that uses lipid nanoparticle

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<sup>1</sup> <https://can-acn.org/covid-impact-survey/>

technology that was developed right here in Canada. This is just one success story out of hundreds, possible only because of the investment that Canada has made in fundamental, non-targeted research.

**Canadian scientists work for all Canadians.** Their discoveries fuel the innovation economy, their laboratories train highly qualified personnel who contribute to diversifying the Canadian workforce, and their discoveries also provide hope to Canadians who live with diseases for which there are currently no cures, and few treatments. For example, **Neurological disorders, such as Alzheimer's disease and ALS, are the leading cause of disability and the second leading cause of death worldwide<sup>2</sup>.** The burden of neurological disorders has substantially increased over the last 25 years with ageing of the population and has had a **growing impact on the economy.** Canadian neuroscientists strive to find cures and treatments and need the support of the government to do so.

**Investing in fundamental research will allow Canada to address these important challenges.** Fundamental research to understand how the brain and nervous system work offers our best chance to reduce the burden of neurological disorders and to improve the quality of life of Canadians. COVID-19 has shown us that a health crisis can have wide ranging effects on our health, economy and mental wellbeing. Investing in scientific research now is an investment in scientific readiness, to be prepared to face the next health challenge.

C- Robust and predictable increases in funding for fundamental research will support Canada's scientific community in the long term.

Canadian neuroscience laboratories that perform fundamental research rely mainly on funding provided by the Canadian Government through the tri councils (CIHR, NSERC, SSHRC). Project grants awarded by the CIHR are the core funding mechanism for biomedical research in Canada. Unfortunately, **success rates in recent competition have been dwindling** (Figure below). The success rates for funding applications at CIHR has steadily declined since 2005, from a 33% success rate to a value just above 15% in 2020 (one in six successful applications), leading to financial insecurity for laboratories. Current success rates are too low to maintain a diverse and flourishing research environment, as many excellent research programs go unfunded. Researchers spend countless hours writing grant applications, while their chance of being successful are too low to be sustainable. In addition, it should be noted that the current 15% funding level is only achieved by making drastic cuts to the budgets of all project grants (often >25%), which further highlights the lack of sufficient funding for this competition.

While detailed financial analysis could explain this decline in success rates, one clear contributing factor is the fact that the CIHR budget has not significantly increased in more than a decade. The budget for CIHR in 2007-2008 was \$927M and in 2019-2020 it was \$1135M. While this represents an increase in actual dollars, when inflation is considered (using the bank of Canada inflation calculator), it represents only a 2.5% increase in constant, 2006 dollars. The number of researchers has increased

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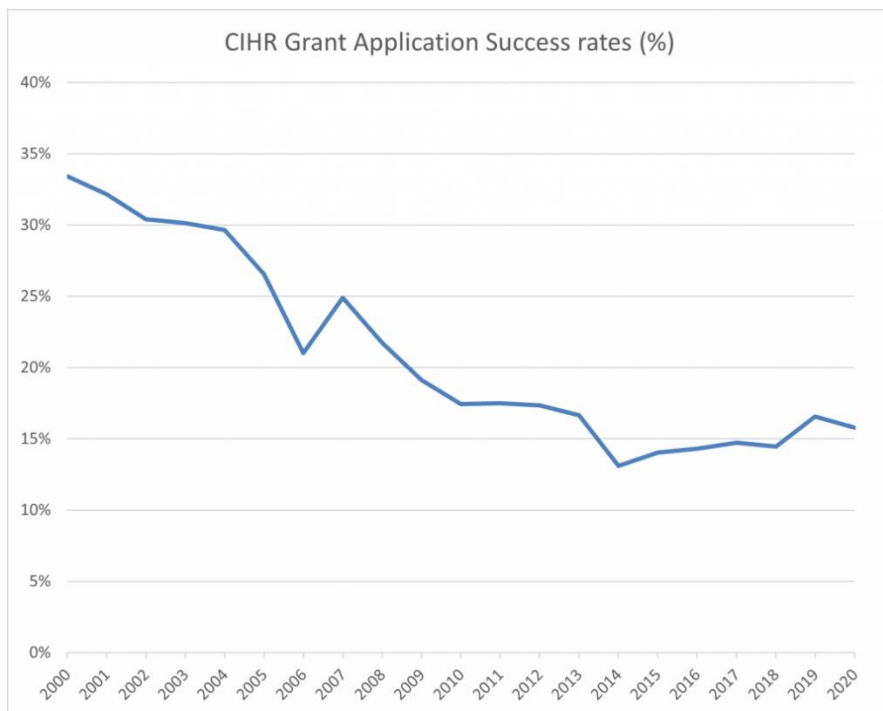
<sup>2</sup> (Feigin et al. Lancet Neurol. 2019;18(5):459-480. doi:10.1016/S1474-4422(18)30499-X)



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(3850 applications in 2006 vs. 4629 in 2019), and the cost of experimental materials increases at a higher rate than inflation.



Most research projects are long-term endeavours. Loss of funding for a single year, because of the hypercompetitive funding situation, means having to let go specialists that cannot easily be replaced -very significant setbacks in research. Some laboratories do not recover, and end up closing, or moving to more supportive environments, in other countries.

If you recall the important contributions to development of the Pfizer COVID vaccine by Dr. Pieter Cullis, referenced above, note that he was doing his research back when the success rate for funding projects was higher. In 2005, more than 30% of grant applications were funded. Today's much lower success rates mean that many outstanding research projects, projects just like Dr. Cullis's, will not get funded and, therefore, will not get completed.

A stronger investment in scientific research would also allow Canada to retain its brightest and to attract new talent. Without it, our scientists might find it more favourable to bring their talent elsewhere.

Therefore, we recommend, after an initial boost to the science budget of 25% in 2022, to include a 10% increase yearly to tri-council funding. This will ensure predictable increases in funds and more financial security for researchers and trainees.

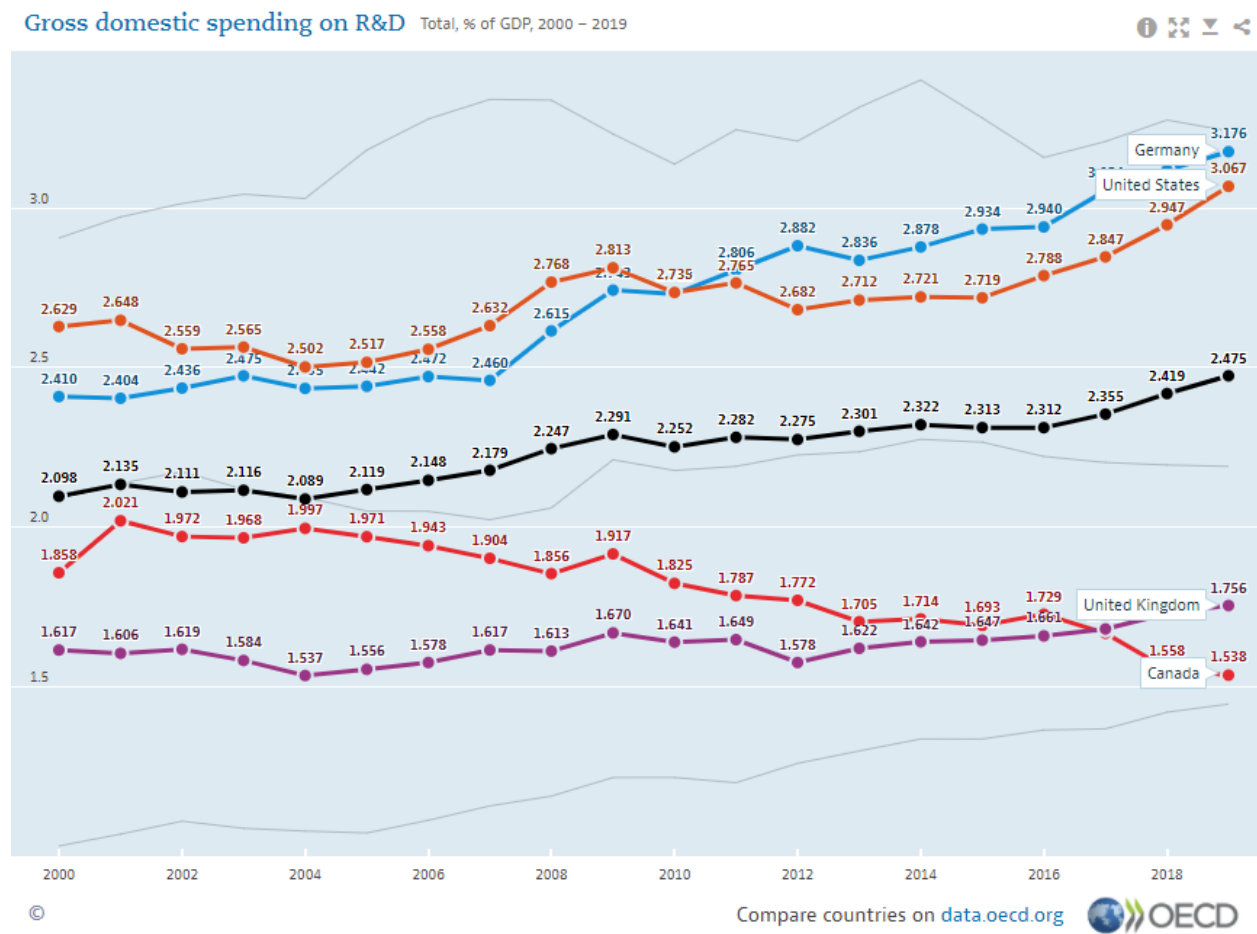


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D – Investments by the Canadian government in fundamental research supports the research and innovation economy.

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 investment in Research and Development have steadily declined in the last 15 years.



OECD Data on Gross Domestic spending on Research and Development - Canada compared to other countries of the G7. Dark black line is OECD average.<sup>3</sup>

This data shows Canada ranks second to last of the G7 countries in terms of Gross Domestic spending on Research & Development, with only 1.5% of its GDP invested in R&D. This low investment level also places Canada below the average of OECD countries, at 2.5%, and well below the US, with 3.1% of its GDP in R&D.

<sup>3</sup> (Accessed on 27 July 2021) Chart permanent URL: <https://data.oecd.org/chart/6qLi>

We recognize that government investment in R&D is only a small proportion of the total R&D investment in a country, however, research shows that government investment is multiplied by private investments, leading to a high return on investment.

Many countries have recognized this, including Japan, Germany and the USA. In May 2021, President Biden's first big budget request proposed increases for science budgets, including a 21% increase to the National Institutes of Health (NIH)<sup>4</sup>. NIH's 2020 budget was \$USD 41.5 billion dollars, compared to CIHR's \$CAD 1.1 billion, a 46-fold difference in funding, which contrast with only nine-fold difference in population. Adjustments for GDP per capita or purchasing power have only a minor influence on such large discrepancies. The latest NIH budget announcement will further increase this gap.

### E- Investing in research helps create quality jobs in Canada.

Investing in scientific research also means the creation of jobs for highly qualified personnel within scientific research laboratories. In a survey we ran in the summer of 2020<sup>5</sup>, Canadian scientists revealed that **over 60% of funds given to laboratories through CIHR, NSERC and SSHRC grants are used to pay for salaries of trainees, research assistants, technicians and post-doctoral fellows that perform research activities in Canada**. The people trained in research laboratories constitute important assets for medical and high-tech companies in Canada.

### Closing remarks

The COVID-19 pandemic has highlighted the importance of scientific research in Canada in times of crisis. We need now, more than ever, to build on the scientific discoveries of Canadian scientists to ensure we recover from COVID-19 in the immediate future. We recommend a one-time 25% stimulus to bring Canadian research back to pre-COVID levels, and predictable long-term research funding increases to meet new and existing challenges. Building Canada's in-country expertise and capacity will also reduce our dependence on other countries.

Significant investments in science need to be made this year and in coming years. Canada's Fundamental Science Review, published in 2017 by the government of Canada<sup>6</sup>, offers a clear path to reinvest in scientific research through the three main granting councils. Our recommendations are in line with the recommendations of the Science review and are supported by the Canadian scientists we surveyed.

Our scientists are ready and motivated to work for Canada, and to contribute to Canada's recovery and economic restart. Investing in research today will ensure we can meet new and existing challenges and remain competitive in a changing economy.

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<sup>4</sup> <https://www.sciencemag.org/news/2021/05/biden-seeks-big-increases-science-budgets>

<sup>5</sup> <https://can-acn.org/covid-impact-survey/>

<sup>6</sup> [sciencereview.ca](https://www.sciencereview.ca)



Recommendations:

Recommendation 1: That the government of Canada provide a **one-time 25% increase in investment 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 research restart and recovery from the setback of the COVID-19 pandemic to research laboratories in Canada.

Recommendation 2: The government should commit to providing robust and predictable funding for basic discovery research to sustain and grow Canada's scientific community. **Funding to the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC) and the Social Sciences and Humanities Research Council (SSHRC) should be increased by at least 10% yearly.** This recommendation is in accordance with the 2017 Fundamental Science Review and will ensure Canada's research ecosystem is healthy and resilient to face any future challenge.



## About the Canadian Association for Neuroscience

The Canadian Association for Neuroscience (CAN) is the largest association of neuroscientists in Canada, all dedicated to advancing brain research. Our members work at academic institutions across Canada.

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