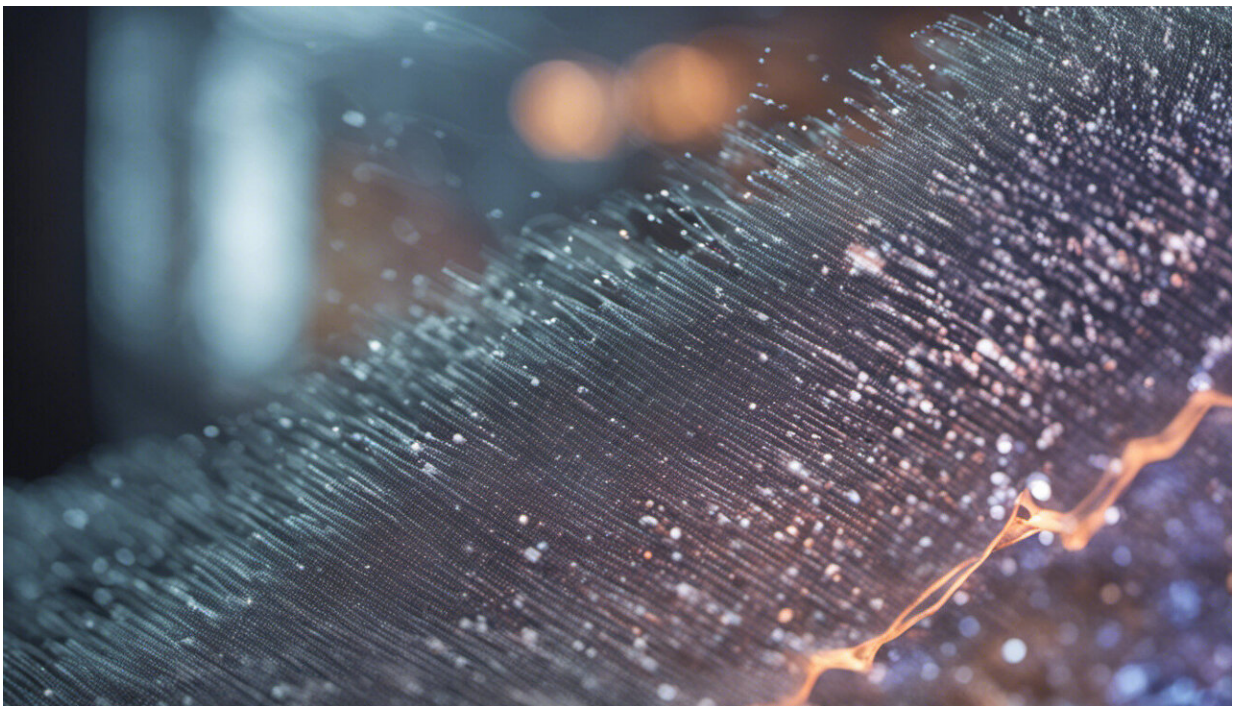


Commentary: Two decades of stagnant funding have rendered Canada uncompetitive in biomedical research

February 17 2023, by Stephen L Archer



Credit: AI-generated image ([disclaimer](#))

You may imagine that the hard part of being a Canadian scientist is having a bright idea. However, while curiosity, persistence and inventiveness are prerequisites for scientific success, the major obstacle to being a biomedical scientist in Canada is obtaining research funding.

Canadian biomedical scientists receive funding to hire scientific staff and buy experimental materials by applying for federally funded grants from the [Canadian Institutes of Health Research](#) (CIHR).

To purchase their high-tech tools (infrastructure), researchers apply for grants from the [Canada Foundation for Innovation](#) (CFI). These [grant agencies are underfunded](#), and some of their programs are poorly designed, with [funding success rates so low](#) scientists must apply repeatedly to obtain funding that is financially inadequate.

As a result, Canadian scientists may feel like they spend more time writing grant applications than doing research. The reality is that [stagnant funding is holding back Canadian science](#).

Securing CIHR grants has become impractically competitive. Most applications require multiple revisions and resubmissions, often imposing an interval of one to two years between first submission and funding. Since funding from a CIHR project grant only lasts five years, the life of the lab—and the jobs of Canadian scientists—are recurrently in jeopardy.

Core funding issues

Let's review the core problems with the funding of Canadian science. Stagnation in Canada's biomedical grant funding reflects the fact CIHR's funding from the Government of Canada [has not increased since 2006 \(in constant dollars, year 2000\) and is not predicted to increase by 2025](#).

The United States is a relevant comparator because it is home to many of the world's leading scientists. Canadian scientists, if not funded, often relocate to the U.S. Compare America's National Institutes of Health (NIH) 2020-21 budget of [US\\$45 billion](#) (roughly C\$60 billion) to CIHR's C\$1.2 billion. America's NIH budget is 50-fold that of Canada's

CIHR budget, but the U.S. population is only nine-fold greater than ours.

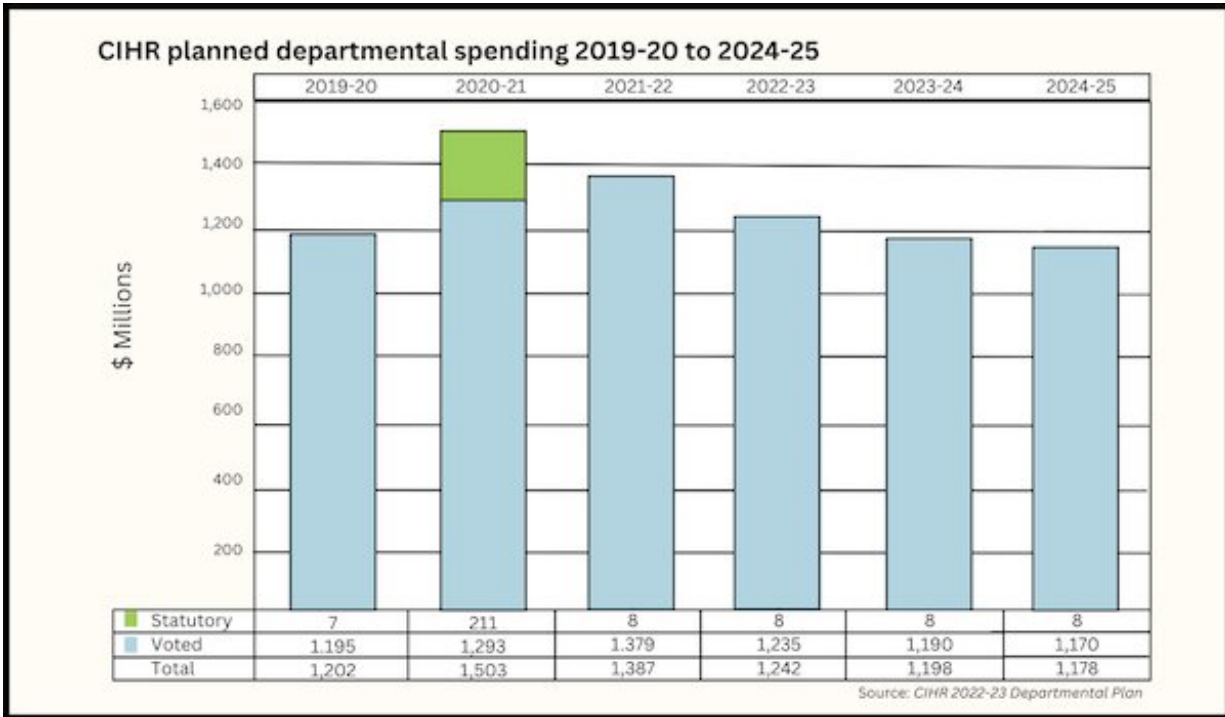
[Canada's spending on research and development](#), as a percentage of gross domestic spending, is also smaller than the U.S.'s.

Grant competition success rates

The success rate in CIHR grant competitions has declined from 31 percent in 2005 to [around 15 percent in 2020](#).

CIHR evaluates applications on a [scale of zero to 4.9](#), corresponding to categories of poor, fair, very good, excellent and outstanding. Currently, CIHR grants are rarely funded unless the voted score is outstanding (rated 4.4 to 4.9). Usually only the top 18 percent of all grants—[fewer than one in five](#)—are funded, and virtually all grants rated excellent are rejected.

This low-success endeavor is a demoralizing waste of time for the 82 percent of scientists who are rejected and for the peer-review volunteers—unpaid colleagues who spent weeks reviewing the applications.



Graph of planned spending over time illustrates that CIHR funding is flat.
Credit: CIHR data

Once funded, challenges remain. All CIHR awarded project grants are now subject to a [23.5 percent across-the-board funding cut](#). This cut allowed CIHR to fund 87 additional grants per competition from 2018 to 2020, however the value of a five-year project grant shrank from \$950,000 to \$725,000.

These cuts mean scientific staff must take pay cuts or be terminated, and the approved research can only be partially completed.

Fixing funding

Canada needs to revitalize its scientific mojo and [to do so must improve](#)

[research funding](#). There are several steps that would improve science funding in Canada.

1. Implement the Fundamental Science Review recommendations

The fix for Canadian science was well enunciated by the [Fundamental Science Review, also known as the Naylor Report, in 2017](#). This report recognized that underfunded Canadian science was falling behind.

It noted that federal underfunding is exacerbated by CIHR's practice of earmarking substantial portions of its limited funds to targeted proposals that address governmental priorities, rather than funding research and discovery science.

The report made simple recommendations to improve Canadian research: "Rapidly increase its investment in independent, investigator-led, research to redress the imbalance caused by differential investments favoring priority-driven, targeted research."

It also recommended "formation of an independent advisory committee on basic research and industrial innovation, comprised of leaders in research and industry" (not [government employees](#)). Our government currently makes many top-down science funding decisions without a strategic scientific plan or an external scientific committee to advise them. An independent advisory committee would reduce political interference in science.

The Naylor report's recommendations have not been fully implemented, but would transform Canadian research. This would require commitment of an additional 0.4 percent of the Government of Canada's annual budget to our science sector.

2. Fund salaries for scientists who run infrastructure

In the meantime, CFI and CIHR could each implement "researcher-centric" changes.

CFI could accompany its infrastructure grants with funding for the scientists who are needed to operate these complex research platforms.

| CIHR's rating scale for most programs | | |
|---------------------------------------|-----------|---|
| Descriptor | Range | Outcome |
| Outstanding | 4.5 - 4.9 | May be funded – will be discussed by the committee |
| Excellent | 4.0 - 4.4 | |
| Very good | 3.5 - 3.9 | |
| Fair | 3.0 - 3.4 | Not fundable – may or may not be discussed by the committee |
| Poor | 0.0 - 2.9 | |

Source: CIHR Review Guidelines – Priority-driven initiatives

Almost all grants scored by CIHR as excellent go unfunded. Credit: CIHR data

CFI grants are used to purchase the multi-million-dollar tools needed to conduct research at the cutting-edge, such as [NextGen gene sequencers](#) and [super resolution confocal microscopes](#). [CFI has a 30 percent funding success rate](#), allowing purchase of infrastructure; but it does not pay for

the scientists who run these scientific infrastructure platforms.

This makes it difficult to sustain a CFI scientific platform.

3. Bring back the foundation grant program

CIHR could resurrect its very successful foundation grant program.

CIHR understood that its most successful scientists usually required two to three project grants, and recognized the time drag that acquiring multiple project grants required.

They responded in 2014 with the foundation grant program. Foundation grants allowed scientists to bundle all their research into a single, comprehensive application which offered more [funding](#) (equivalent to two to three project grants) for a longer duration (seven years instead of five years for project grants).

This allowed researchers to spend more time on doing science and less on writing and reviewing grants. My foundation grant gave me the stability and flexibility to simultaneously study oxygen sensing, mitochondrial dynamics and to develop drugs to treat pulmonary hypertension, cancer and [COVID-19](#).

However, the [foundation grant program was unceremoniously terminated](#), forcing [grant](#) holders to once again, apply for two to three simultaneous project grants.

Funding research pays off

Researchers are key to Canada's capacity to create a high-tech economy, build the biomedical sector and seed entrepreneurial activity.

Researchers also support our academic health sciences centers and universities, making them internationally competitive.

Research has a great return on investment, with an estimated [30 to 100 percent of the expenditure on publicly funded research being returned to society](#). Each research laboratory is a small business creating well-paying jobs, knowledge and intellectual property, which many commercialize.

In addition to launching medical innovations, patents and spin-off companies, Canada's researchers teach university students, and many CIHR-funded clinician-scientists provide patient care in our hospitals. In all of these ways, investment in research is critical to making Canada healthy, wealthy and wise.

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