Association of Canadian Early Career Health Researchers

Association de chercheurs canadiens en santé en début de carrière

Report for CIHR Summit
Ottawa, ON: July 13, 2016

The Association of Canadian Early Career Health Researchers (ACECHR) is pleased to be invited here, particularly as many of our members are signatories of the open letter led by Dr. James Woodgett that led to this meeting.

We are represented at this meeting by two of our three national co-chairs, Dr. Kristin Connor (Carleton University, pillar 1) and Dr. Holly Witteman (Université Laval, pillar 3). ACECHR member Dr. Meghan Azad (University of Manitoba, pillars 2 and 4) is also attending the meeting and has reviewed this document, as have many other members of our Association, including our other national co-chair, Dr. Michael Hendricks (McGill University, pillar 1), who was unable to attend this meeting due to conflicting travel.

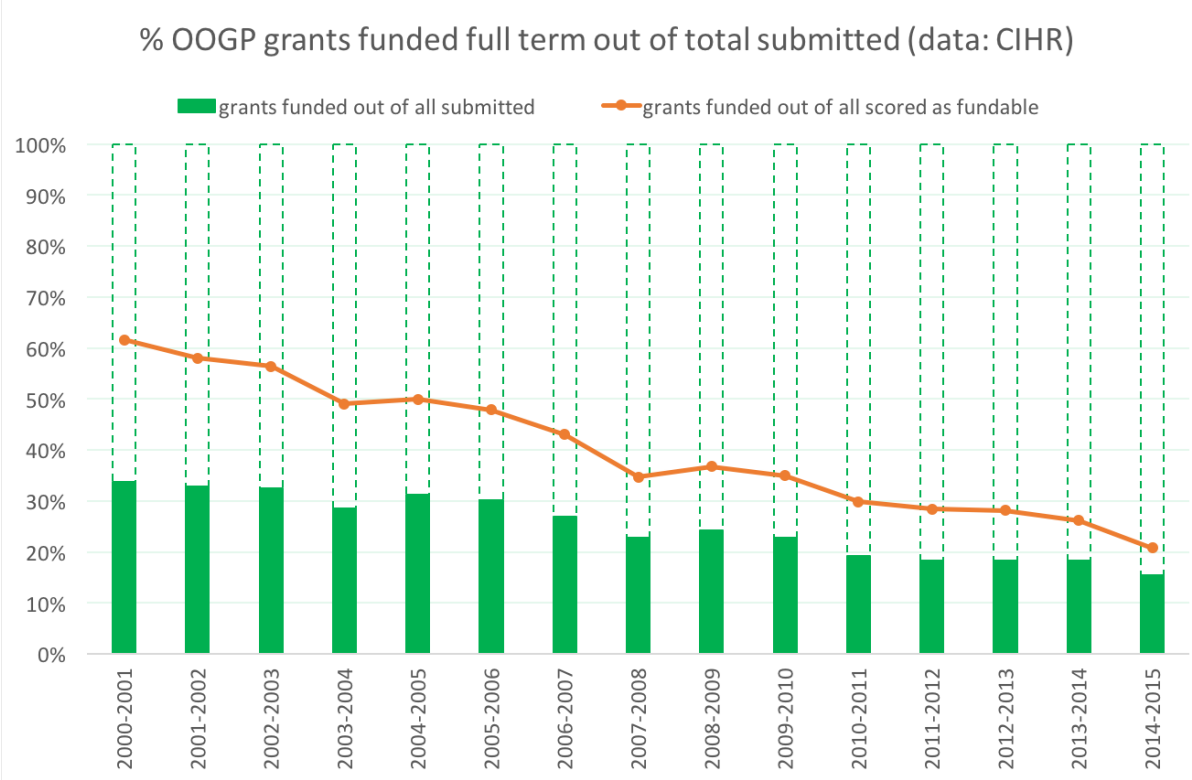
Having met with the Canadian Institutes of Health Research (CIHR) multiple times since our formation early this year and having discussed the issue of funding for Early Career Investigators (ECIs) at length amongst our membership, we already had established a significant level of consensus around the changes needed to support the future of Canadian health research. We sought further consensus amongst ECIs across Canada to prepare this report, sharing drafts of this document widely, receiving and integrating comments to ensure that the concerns and recommendations contained herein reflect broad overall consensus among ECIs. In this report, we:

- *outline issues specific to ECIs,*
- *make three specific recommendations for immediate implementation before the next grant cycle, and*
- *make three additional recommendations for longer-term action.*

SUMMARY

Early Career Investigators (ECIs) are facing challenges:

- We started our careers in a time (2011 and later) in which securing a Canadian Institutes of Health Research (CIHR) grant from the Open Operating Grant Program (OOGP) was already far more difficult than it had been in the past.[1]



- Leading up to the reforms, there were two cancelled competitions during our critical and vulnerable years as early career faculty. The cancellation of the CIHR New Investigator program has also removed a former source of support for ECIs during critical launch years.

- The CIHR reforms are estimated to result in a major shift of limited grant dollars away from ECIs, as compared to historical proportions of funds awarded to senior, mid-career and ECIs. Without intervention, this loss amounts to an estimated one third of historical annual funding to ECIs, about $30M in total, at least.[2] Mid-career investigators are also losing funds that used to be more equitably distributed. Senior investigators are projected to receive a greater proportion of funds in the reforms than they did historically, an imbalance that threatens future discoveries and the long-term sustainability of the Canadian health research enterprise.

- Results from the first Foundation Scheme suggest that the new system is favouring male applicants over female applicants, even when controlling for ECI vs. established status (OR: 1.49; 95% CI: 1.03-2.21).[3] ECI applicants consisted of more women (42%) than established investigators (33%), compounding the negative effects of the reforms on ECIs.[4] When there is systemic bias in grant review, it means that we aren't funding the best research.

To address the disadvantages affecting ECIs, we recommend three immediate changes, before the next grant cycle:

1. **Equity:** Enforced equity in grant funding rates across all career stages and by sex, with changes to the Canadian Common CV to help support this.

    - Set proportional paylines according to number of unique nominated principal applicants (NPAs) at each career stage (similar to NIH's adjustment for ECIs) and by sex.
    - Clearly define ECI status, including when it starts and stops.
    - Change the Canadian Common CV limits to ensure years of productivity are not missing due to absences such as maternity, parental and other leaves.

2. **Opportunity:** Flexible grant applications allow ECIs to demonstrate what reviewers expect to see. Structured forms are suboptimal for all and they are especially hard on ECIs, who no longer have the flexibility or space to demonstrate aspects of a grant that reviewers expect to see from ECIs.

    - Limit application pages (e.g., 12 pages) and let applicants structure the pages as appropriate to their field, including allowing tables and figures within the pages.
    - Do not limit references.
    - Ensure ECIs can attach letters of support, with or without a financial component.

3. **Expert review:** Reviews from people who have (a) expertise in our fields and (b) sufficient time to adequately review our grants and offer constructive feedback.

    - Use topic experts (i.e., trained researchers) to help identify appropriate reviewers.
    - Ensure that all grants are sent out together and with sufficient review time.
    - Establish a clear expectation that reviewers participate in discussion and provide constructive, actionable feedback to applicants. (See also recommendation 4.)

Following these immediate changes, we further recommend to **CIHR:**

4. **Transparency and accountability:** Greater transparency and accountability from CIHR and reviewers.

5. **Funding balance:** Foundation Scheme restructured as a grant consolidation mechanism for those with 2+ or 3+ grants, in which researchers trade off a small amount of budget for greater stability and flexibility.

To the **federal government**, we recommend:

6. **Investment in health research:** A return to more sustainable levels of health research funding in pursuit of (a) a healthy and stable health research enterprise, (b) young Canadians pursuing degrees and careers in health research and related fields, (c) a flourishing knowledge economy and (d) strong production of new knowledge and health benefits for Canadians.

DETAILS: RECOMMENDATION 1 - EQUITY

1. Enforced equity in grant funding rates across all career stages and by sex, with changes to the Canadian Common CV to help support this.

What this means

- Equitable distribution by career stage and sex.
- We need equity going forward and correction for the current cohort of ECIs who have been caught in the reforms.
- This supports funding the best science by removing the potential effects of systemic bias.
- If there is no bias in review, there will be natural equity and no need for enforcement.

Why this is important

- Equity by career stage is vital for meeting CIHR Act 4j and ensuring a sustainable health research enterprise.
- Equity by career stage was achieved informally in the Open Operating Grant Program (OOGP).
- Enforced equity ensures we are funding the best research, rather than having funding decisions distorted by known biasing factors that show no evidence of being relevant to research quality.

Ways to address this

- Set defined floors according to unique applicants per competition by setting equitable paylines by career stage & other factors accordingly. This would function similarly to the National Institutes of Health (NIH) payline adjustment for ECIs, except we propose applying it across all career stages, not only ECIs, and also to achieve equity by sex.
    - For example, if a competition has 1000 unique nominated principal applicants (NPAs), 200 of whom are ECIs, then ECIs receive 20% of the awarded grants. This same method also applies across other career stages (mid-career investigators in years 5-9, 10-14, etc.) and by sex.
    - We do not support equalization by proportion of budget because of concerns this would lead to penalization of ECI budgets.
    - Though we do not believe it would be necessary, we are open to the idea of a quality screen to avoid groups submitting more grants simply to increase their proportion of NPAs in a competition.
    - Proportional allocation by number of grants by competition still allows for the natural accumulation of multiple grants by mid-career and senior investigators and the expected higher annual operating budgets for advanced researchers with larger labs.
    - We also support equitable distribution beyond career stage and sex to address other potentially intersecting sources of bias, including whether or not the applicant is an Indigenous person, a member of a visible minority, or a person with a disability. Such characteristics would need to be collected by CIHR to implement such an approach.
- To apply this, we need clarity from CIHR regarding ECI status. We are currently lacking a clear definition of how many years ECI status lasts and exactly when does the clock start & stop.
    - We suggest using one or more range(s) of career stages to level the playing field for new ECIs as well as early mid-career applicants who have been caught in the reforms.

- We further suggest that equity adjustments should consider the difference between ECIs who have already received a substantial CIHR grant and those who have not. The current definition of an ECI groups together a biologist with a PhD coming out of her postdoc with a clinician-scientist who has received multiple CIHR grants over the past decade but only recently started her first faculty appointment. Both of these groups deserve a level playing field to launch their careers as faculty members, but their situations and needs differ in a number of ways.
- We recommend adjusting time limits on Canadian Common CVs (CCVs) such that everyone gets to show the same number of years of productivity. Currently this is not the case and people who have taken a maternity, parental or other leave are penalized on both the Foundation and Project Scheme CCV. This primarily affects younger female applicants.

What this means in the case of a return to face-to-face panels

- Defined floors, clarity about ECI status and adjusted time limits on application CCVs would still need to come into play.
- We strongly recommend seeking diversity in all panels by explicitly seeking to include ECIs, women, Indigenous people, people of colour, and people with disabilities.

DETAILS: RECOMMENDATION 2 - OPPORTUNITY

2. Flexible grant applications allow ECIs to demonstrate what reviewers expect to see. Structured forms are suboptimal for all and they are especially hard on ECIs, who no longer have the flexibility or space to demonstrate aspects of a grant that reviewers expect to see from ECIs.

What this means

- Give ECIs the opportunity to show the materials required in their field to help reviewers develop confidence in ECI applicants.
- Have a flexible structure that applicants can adapt to their field.
- Allow people to show preliminary data, full references, and letters of support.

Why this is important

- Because different fields have different requirements, a uniform structured form creates problems in different ways for different fields, and yet problems exist across fields.
- It is more feasible for more established investigators to rely on previous work to help reviewers understand the value and feasibility of their proposal. ECIs need to be able to structure grants in the way that is expected in their field, show preliminary data, adequately reference their statements, and attach letters of support if expected in their field.
- Because different fields have different citation practices, limiting references unfairly penalizes applicants in fields that tend to spread results over multiple papers.
- Letters of support are a critical element of demonstrating feasibility for ECIs in some fields. Not allowing these letters penalizes ECIs in such fields.

Ways to address this

- Grants should be limited in page length but unstructured. In other words, applicants can upload a certain number of pages, formatted as per requirements for margins and minimum font size.

- There is strong support amongst ECIs to adopt a format similar to an NIH R01 application: 12 pages, tables and figures included. Using a familiar, standard format is easier on both applicants and reviewers.
- References need to be unlimited. There are few to no downsides to unlimited references and many advantages. Allowing full referencing makes reviewers' job easier because applicants can then put in full citations and demonstrate the basis for their proposal rather than requiring reviewers to guess or to go looking for more information outside the application.
    - We are aware that one idea behind the reference restrictions in applications in the reforms was to stop reviewers from seeking additional information. We believe that this idea reveals a fundamental misunderstanding of how scientists around the world approach peer review, and also a lack of awareness of the psychology of expert assessment and decision making.
- Applicants must also be able to attach unlimited letters of support, including letters committing to participation and/or access to resources or sites, not only those committing funds.

What this means in the case of a return to face-to-face panels

- Same approach.

DETAILS: RECOMMENDATION 3 – EXPERT REVIEW

3. Reviews from people who have (a) expertise in our fields and (b) sufficient time to adequately review our grants and offer constructive feedback.

What this means

- Future review processes must avoid the problems observed in the first Project Scheme. For example:
    - The $1.7M Elsevier keyword matching software did not work in many cases, so matching of grants to reviewers was done by CIHR staff who lacked the relevant scientific training necessary to make such judgments.
    - Reviewers included people who self-declared as having insufficient expertise to review a grant, and yet were assigned the grant anyway.
    - Virtual Chairs' suggestions of more appropriate reviewers were ignored.
    - Some applications were sent out to reviewers only days before the deadline, without notification.
    - Some reviewers didn't know there was an online discussion period.
    - Different reviewers had different deadlines.
    - A number of reviewers and virtual chairs were not sufficiently engaged in the reviewer process, did not submit reviews on time, did not participate in discussions, submitted ranks without reviews, submitted ranks after discussion and after consensus had already been reached, or completely disappeared and did not participate at all.
- This is all completely unacceptable and can never happen again.

Why this is important

- To meet international standards for peer review.

- To provide ECIs with constructive feedback from people to whose expertise we may not otherwise have access. Reviews help research move forward even if not funded by helping ECI applicants understand better where to focus and prioritize.

Ways to address this

- Use topic experts (i.e., trained researchers) to help identify appropriate reviewers.
- Ensure that potential reviewers, including untapped experts and ECIs, are considered for reviewing duty.
- Ensure that all grants are sent out together and with sufficient review time.
- In the case of online review, don't rely on reviewers to attend an optional webinar or to read detailed instructions: put out a very brief set of key points.
- Establish a clear expectation that reviewers participate in discussion and provide constructive, actionable feedback to applicants. (See also recommendation 4.)

What this means in the case of a return to face-to-face panels

- Not applicable (it's handled if there is a return to panels).

DETAILS: RECOMMENDATION 4 – TRANSPARENCY AND ACCOUNTABILITY

4. Greater transparency and accountability from CIHR and reviewers.

What this means

- Applicants know how the system works, including who is reviewing their grants, and how funding decisions are made.
- Reviewers and chairs are socially accountable to their peers for their reviews & participation in discussion.

Why is this important

- To rebuild trust in the system.
- Peer review is a social process. This core aspect of human behaviour, as well as significant literature on best practices in online collaboration, were completely ignored in the design and implementation of the online review process.

Ways to address this

- Applicants must know who is or may be reviewing their grant(s).
- Reviewers and chairs need to have accountability mechanisms with teeth. E.g., public listing of names with rate of on-time reviews and participation in discussion; ability for applicants to rate and/or comment on quality of reviews.
- Reviewers lose their positions as reviewers if they don't provide high quality reviews or participate adequately in discussions.
- There is public transparency around how funding decisions are made, including the mathematical formulae and/or normalization algorithm detailing how consolidated ranks are calculated when different reviewers have different numbers of applications in their piles.

- Anonymized, raw CIHR data are available in a timely manner for external inspection and analysis. We would like the following historical data, as well as associated data going forward:
    - applicant's pillar(s)/institute(s)
    - applicant's sex (and gender, if available in future)
    - applicant's age and/or date applicant's degree awarded and/or start date of applicant's faculty position
    - whether or not applicant's CCV contains any leaves, and if yes, dates of leaves
    - new application vs. reapplication
    - competition (year, type)
    - funding mechanism (e.g., priority area)
    - individual score/rank before discussion
    - individual score/rank after discussion
    - final rank
    - number of reviewers
    - how reviewers' scores or ranks were combined to achieve a final score or rank
    - funded or not
    - amount of grant rounded to nearest $1k , $10k or $100k, depending on competition

What this means in the case of a return to face-to-face panels

- List people reviewing, publicly.
- Still make data available.

DETAILS: RECOMMENDATION 5 – FUNDING BALANCE

5. Foundation Scheme restructured as a grant consolidation mechanism for those with 2+ or 3+ grants, in which researchers trade off a small amount of budget for greater stability and flexibility.

What this means

- Upon being awarded a second or third grant, researchers have an automatic option to consolidate their grants and trade off a small amount of budget (e.g., 10%) for greater stability and flexibility.

Why this is important

- The Foundation Scheme has distorted the funding landscape and diverted funds away from ECIs and mid-career investigators. Although in principle, we support the idea of funding people, not projects, in practice, the assessment of a person worth funding has strongly favoured male, senior researchers.

Ways to address this

- Create automatic trigger for grant consolidation.

What this means in the case of a return to face-to-face panels

- Same approach.

DETAILS: RECOMMENDATION 6 – INVESTMENT IN HEALTH RESEARCH

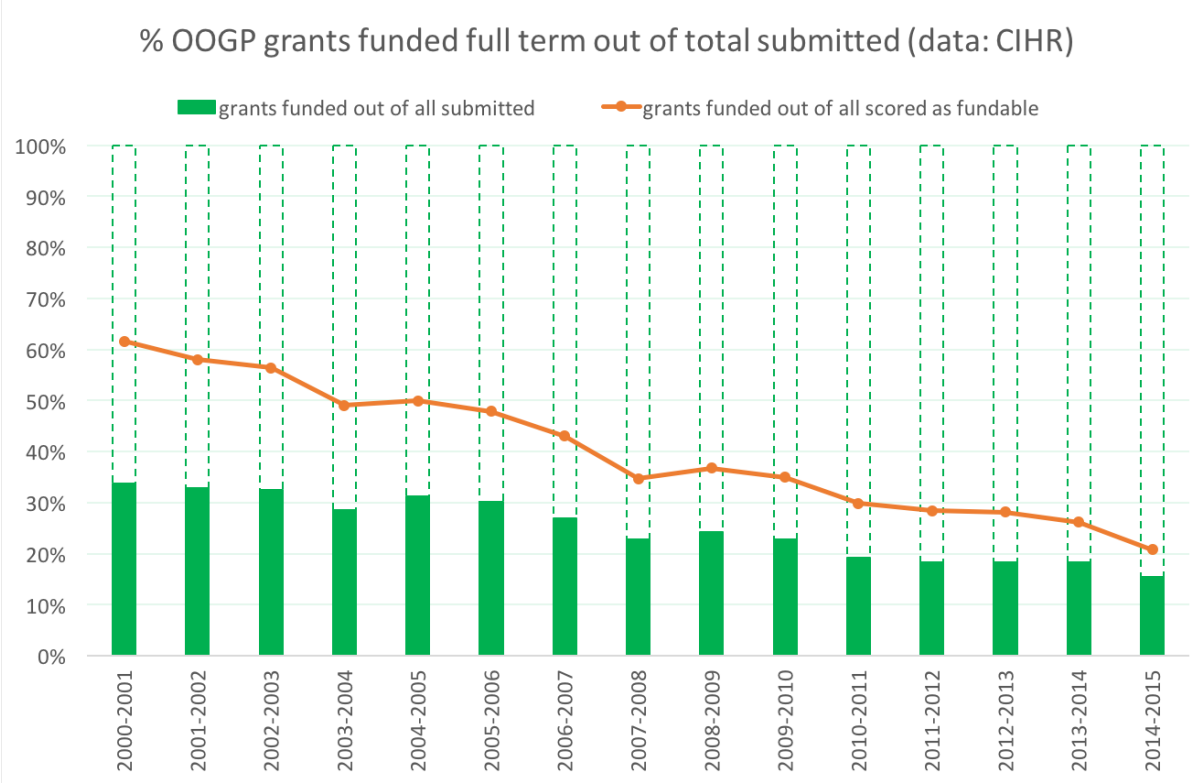
6. A return to more sustainable levels of health research funding in pursuit of (a) a healthy and stable health research enterprise, (b) young Canadians pursuing degrees and careers in health research and related fields, (c) a flourishing knowledge economy and (d) strong production of new knowledge and health benefits for Canadians.

What this means

- Increase CIHR's available budget for open operating funding.

Why this is important

- Many of the most promising discoveries and developments in health research in Canada are rooted in previous years of more stable, healthy funding. Without a return to such levels, such discoveries and developments risk drying up in the coming years.
- ECIs, trainees and others are considering forgoing scientific careers, leaving research, or leaving Canada.[4]

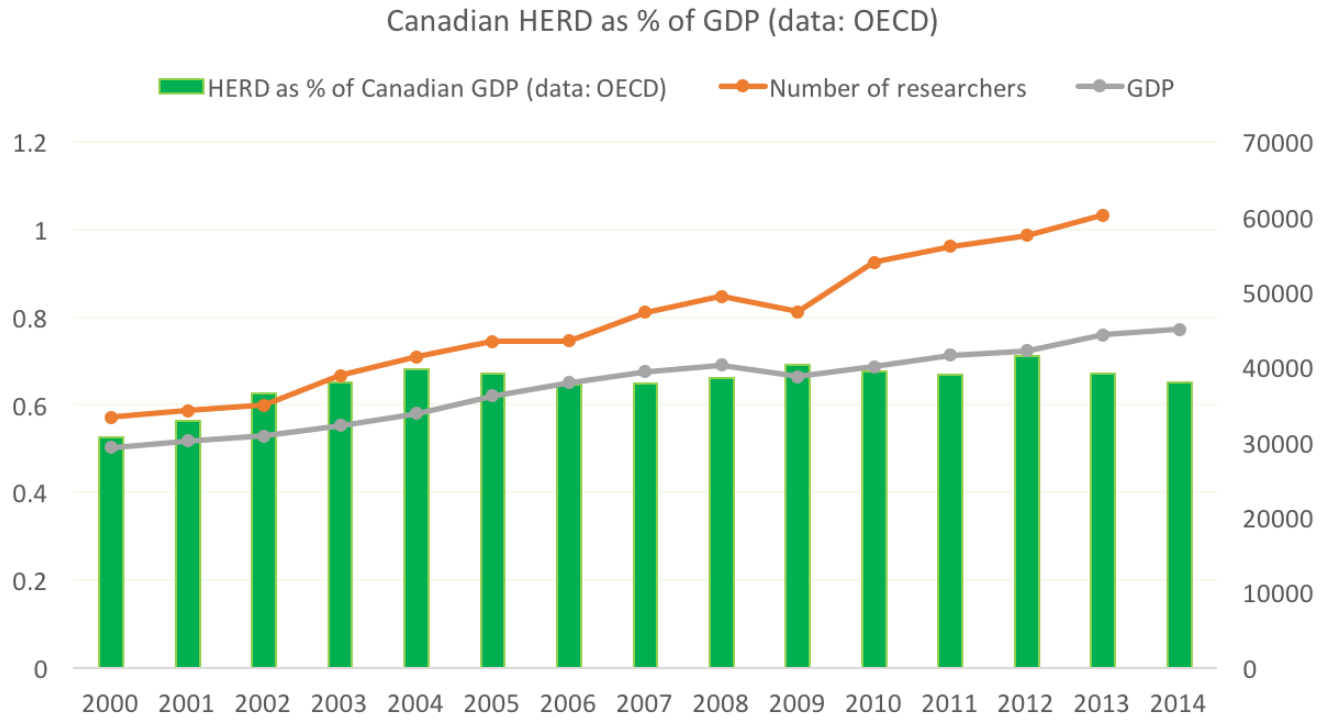


Health research is a key element underpinning a knowledge economy. To the best of our knowledge, there is no full analysis available for Canada regarding the overall economic effects of research or health research investments, though a panel has proposed a framework for such an analysis.[5] An estimate from the United States suggested that for each dollar invested in health research $2.21 may be generated in the first 12 months, and annual returns on investment (ROI) between 20% and 67% have been reported from various developed countries; however, many of these estimates have not been validated.[6] In Canada, a robust economic analysis was conducted on the ROI of cardiovascular research. The authors found that such research yields savings of $0.21/year in perpetuity.[7] That

means the funds invested in such research pay themselves off in less than 5 years and then keep on generating benefits to the Canadian economy, with an annual ROI of 21%.

Even when a specific research project itself doesn't generate such ROI, doing the research creates new knowledge on which others can build and prepares bright students to go on and do even better things that we cannot yet imagine.

Canadian investment in health research is difficult to disentangle from all Higher Education Research and Development (HERD), particularly since, unlike comparable countries, Canada reports HERD with 38% to 45% of professor's salaries included in the estimated total investment.[8] However, we know that total Canadian HERD as a percentage of GDP has been relatively flat over the last decade whilst the number of higher education researchers increased by 55% and GDP, by comparison, increased by only 37%. (See figure below; data are from the Organisation for Economic Co-operation and Development, or OECD.[9]) The most recent Conference Board of Canada report on public research and development, which includes both governmental research and development and HERD, stated that, **"Canada's performance overall is middling and slipping."**[10]



Ways to address this

- Increase CIHR's budget for operating funding.
    - This may be accomplished through new funding and may also be addressed by reallocating funds from large projects (e.g., Canada Excellence Research Chairs, Canada First Research Excellence Fund) that concentrate funds in a few hands rather than supporting a broad array of health research. Supporting a wider diversity of investigator-initiated research may be more likely to result in new discoveries and developments.

What this means in the case of a return to face-to-face panels

- Same approach.

REFERENCES

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N.B. In a previous version of this report, dated July 11, 2016, 2000-2005 data were calculated from graphs: https://twitter.com/DrDylanMacKay/status/731885158899535873 (tweet of graph) and: http://bit.ly/29rWw2r (Dropbox link to slides provided by CIHR to a journalist). These two data sources (CIHR website vs. CIHR-provided slides) yield different estimates of success rates in 2000-2002. Since it is unclear which are accurate, we have used the more conservative (lower) estimates. We lack data on bridge funds prior to 2005, which may further lower estimates in the first 5 columns. Bridge funds in 2005-2015 added median 3% (IQR:[3%,4%], range:[2%,8%]) to CIHR's reported success rates. We count only full funding here.

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4. Association of Canadian Early Career Health Researchers. Early Career Investigators (ECIs) in health research: final report of a cross-Canada survey. April 2016. http://www.acechr.ca/blog/acechr-survey-results (**also see appendix**)

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