
Research Funding

**New paradigms for a
broken system**

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Canadian Science Policy Conference, November 21, 2013

Funding Science

- ❖ While the practice of science itself is often mysterious & beguiling, the methodology by which science is funded is positively Rube Goldberg-ian.
- ❖ Yet, mechanisms of science funding have a huge impact on the types of research that are supported, as well as the quality.
- ❖ With ever decreasing funding rates (CIHR = 16% + 24% cuts), are we heading off the cliff or about to grow wings?



Role of Funders

- ❖ As the primary portal for researchers to access funding, the policies & program designs of the funders have enormous impact on the kinds of research being conducted.
- ❖ This role is often under-appreciated & it's impact can be both subtle & wide-ranging.
- ❖ What are the drivers for change as seen by the funders?
- ❖ How do science funders design their programs?

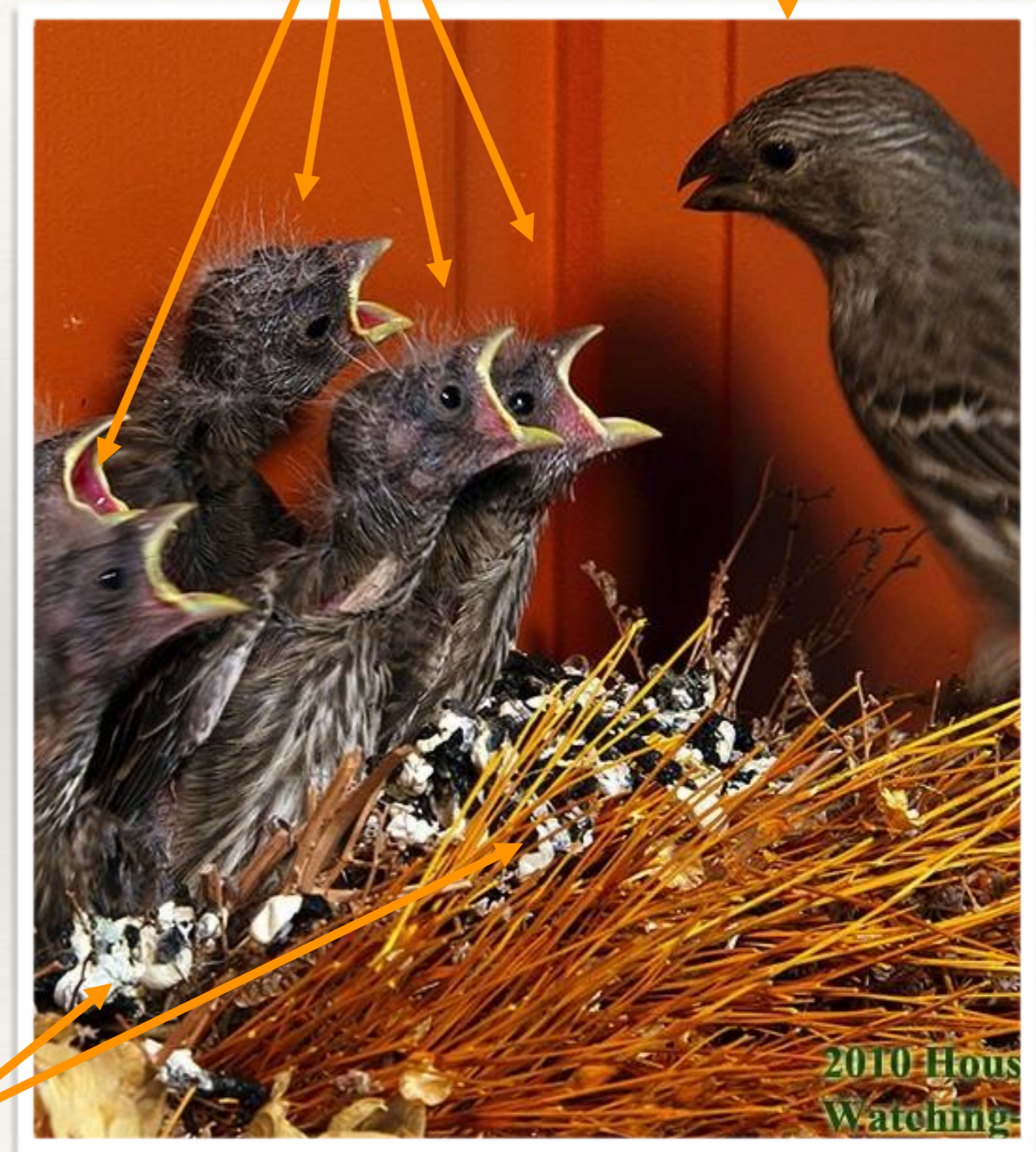
Role of Scientists

- ❖ Researchers see ever changing policies, programs.
- ❖ Researchers see funding simply as a means to an end & often don't engage.
- ❖ Extreme economic pressures - impact on young scientists.
- ❖ Science moving ever faster - many left behind.
- ❖ Insatiable demand - "Show me the money!"

Product

Scientists

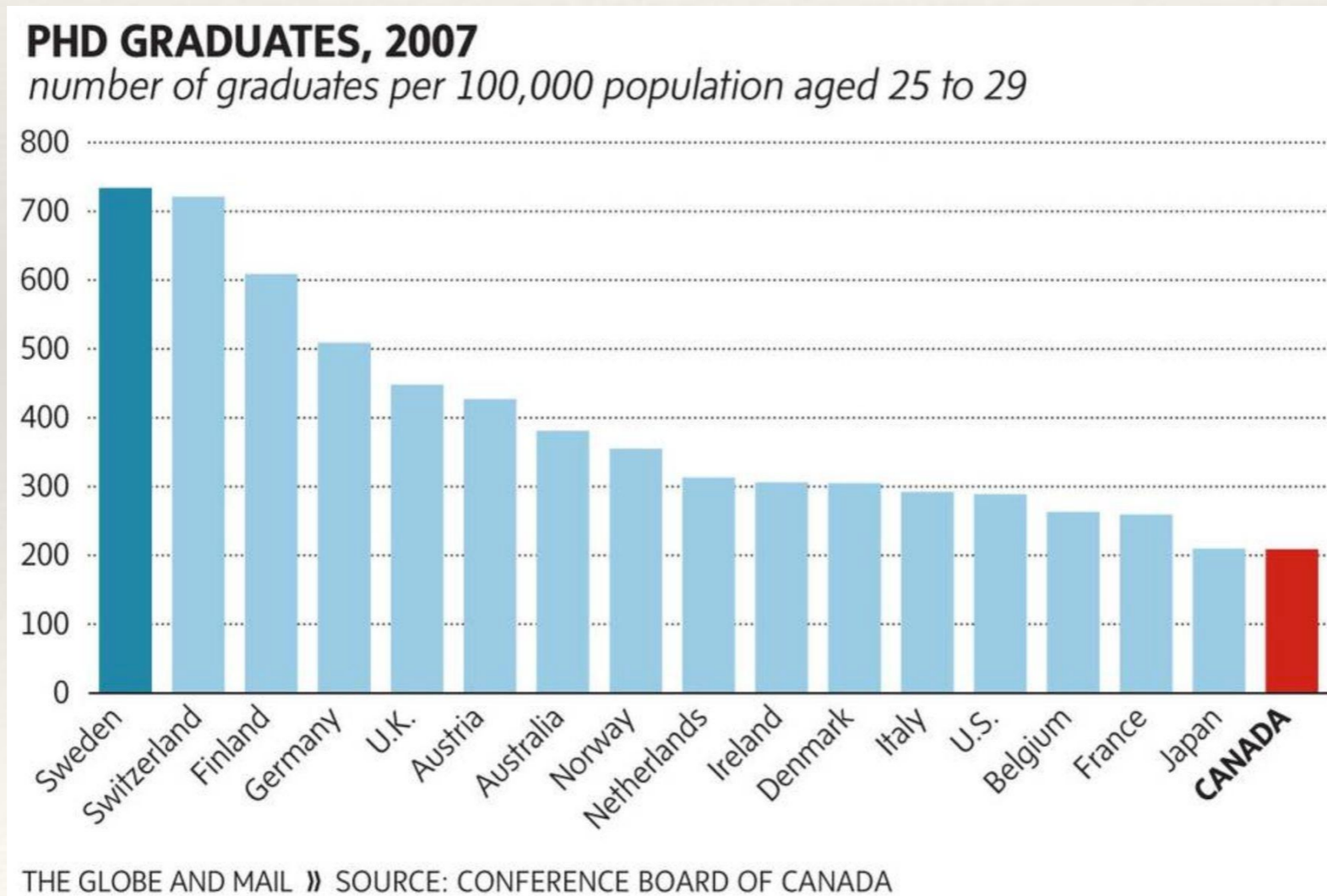
Funders



(Some) Panel Goals

- ❖ **What are the pressures on science funding?**
- ❖ **How are funders dealing with these pressures?**
- ❖ **What is the impact on research/researchers?**
- ❖ **Is how we fund science adversely affecting the quality/type of science we do?**

- ❖ Are there too many scientists in Canada seeking too few \$\$?
- ❖ Are we over-training?
- ❖ Why should young people pursue a career in science?



- ❖ **Should we cap funding per scientist?**
- ❖ **Are our measures of performance accurate?**
- ❖ **How will we know if changes are effective?**
- ❖ **Co-funding - shell game or pro-collaborative?**
- ❖ **Narrowing of applicant eligibility (inc. institutional) - open vs select?**
- ❖ **Who is dropping out as funding systems change? Do we know, do we care?**

Summary

- ❖ Massive, global changes in how research is supported.
- ❖ Some incremental, much “revolutionary”.
- ❖ No room for error due to tenuous nature of current funding/appointments. Lack of safety net/segue funding.
- ❖ Funders “trying to do the right thing”. Scientists either reluctant to change or desperate to change (“can’t be worse than it is”).
- ❖ Little discussion in research community of the impact & nature of the changes - even though their lives will be changed.
- ❖ **Will** impact what science is done & by whom.



Be part of the conversation!



Canadian
Cancer
Society

Société
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Research funding: new paradigms for a broken system?

Canadian Science Policy Conference

November 21, 2013

Christine Williams, PhD

VP Research, Canadian Cancer Society





Canadian Cancer Society
Société canadienne du cancer



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Who am I?

- PhD scientist (UofT Immunology; DNA repair/leukemia)
- Post-doctoral training (Harvard/MGH; chromatin remodeling)
- National VP, Research, Canadian Cancer Society

What do I do?

- oversee \$40M annual research funding
- science policy, communications, strategy development, advocacy...
- monitor and evaluate research impacts
- ask for money & invest it on behalf of donors
- attend a lot of meetings and sit on a lot of committees!
- connect the dots

My perspectives...

- *1 organization*; largest national charitable funder of cancer research
- *cancer research funding alliance*; gov't and NGO funders (CCRA: \$500M/year)
- *health charities sector*; (HCCC; \$200M/year)



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doing research

specific area (pillar 1)
specific cancer

*lots
about a
little*

Change

supporting research

broad areas (pillars 1-4)
all cancers
other diseases
international

a little about lots



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Change

general trends in research funding

- Increasing emphasis on accountability and impact
 - reporting, evaluation, metrics
 - donors & public
 - commercialization & ROI
- Shift towards more translational research
 - applying what we already know
 - 'pipeline' concerns
 - decreasing pharma investment in R&D
- Shift towards more strategic/targeted funding
- Increased emphasis on partnerships and collaborations
 - balancing organizational mandates
 - pharma-academic collaborations
 - team science/big data
- "Not enough money in the system"



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Change

navigating it with a specific example

2010: CCSRI redesigned its research portfolio in order to...

- differentiate (from other funders; within research areas)
- be more financially flexible
- align with strategic goals of the organization's mission
- emphasize impact (on cancer & for donors)

lessons learned

1. Many people are threatened by change...**expect feedback**; listen!
2. No matter how extensive the consultation, **there are more opinions**
3. Nothing is better than '**live**' **conversations** (corollary: we all have too much in our inboxes to read for detail)
4. Identify **key champions** and call on them
5. Where possible, **engage dissenters**
6. Change management process applies to granting agency, applicants and reviewers....and **takes time**
7. "To improve is to change, to be perfect is to change often" ;
evaluate/iterate/seek expert advice
8. Stick it out - **we did the right thing**



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Questions

1. What is the right balance between open operating grants and more strategic investments?
2. Do we have too many Canadian scientists to support?
3. What is the right balance between the basic-translational-applied research spectrum?
 1. should charities fund pure basic science or should gov't do that?
 2. should all scientists be able to articulate the impact of their research on human health outcomes?
 3. should a key outcome of health research be economic return?

Peter Goodhand

Who am I?

Not a scientist → Marketer, Strategist, Executive

Private Sector → Medical Technology Research and Development
Public Sector → Research Commercialization/ Health Technology Assessment
Philanthropic sector → Fund raising and funding agency

Executive Director Global Alliance – Hosted by Ontario Institute for Cancer Research
Chair of Board- HTX; board member MarsEXCITE, CIHR-SPOR, OCRC

Peter Goodhand

What do I do?

Vision:

Work to bring together the public, private, philanthropic sectors to **advance health research**
More funding; Better organization; Greater collaboration, Translation into products and /or practice.

Reality:

Plan, Organize, Debate, Discuss, Plan again, Decide, Implement
Build Relationships, Listen, Understand, Translate, Build bridges
Create incentives, Get Funding

Perspective:

25+ years working with researchers doing everything except the actual research.
Today bringing together biomedical researchers, data scientists, clinicians, patients and the public from 113 + organizations in 18 countries to find better ways to:
Generate, Share, Protect, Apply Genomic data to Advance Human Health.

What I See:

- World is shrinking.
- Boundaries are blurring.
- Time is accelerating.
- Silos are collapsing.
- Individuals and small teams are challenged to compete.
- Global Funding budgets under pressure.
- More competition for flat/declining funding.
- Greater focus on outcomes/deliverables/cause.
 - governments and foundations
 - large donors and informed donors

What I See:

- Democratisation of Science
 - Citizen Scientists
 - Portable dynamic consent
 - Right to withdraw, Right to be forgotten
 - “My DNA”
- Rapid discovery, accelerated treatments vs. privacy/protection/proprietary.
- Precision or personalized medicine

New Funding Paradigms For A Broken System.

- Never really was a “system” for research
- Sector with many distributed parts, localized, individual excellence.
- Funding needs to align the expectations of the funder and the capacity/capability of the research community to deliver.
- Funders must communicate and collaborate with each other and with research institutions and researchers

New Funding Paradigms For A Broken System.

- Public, Private and Philanthropic funders need to work together.
- BIG DATA, BIG SCIENCE, BIG FUNDS.
- Speed/ Costs/ROI demand we work internationally
- Researchers need to translate complex science into impact on humanity
- Researchers need to work with fund raisers (3P) to “sell”- inspire not hype.
- Change is always difficult but can be positive if done for the right reasons, planned well and communicated fully.



Research Funding – new paradigms for a broken system?

Canadian Science Policy Conference

21 November 2013

Jane E. Aubin, Ph.D.
Chief Scientific Officer and Vice-President, Research and
Knowledge Translation
Canadian Institutes of Health Research

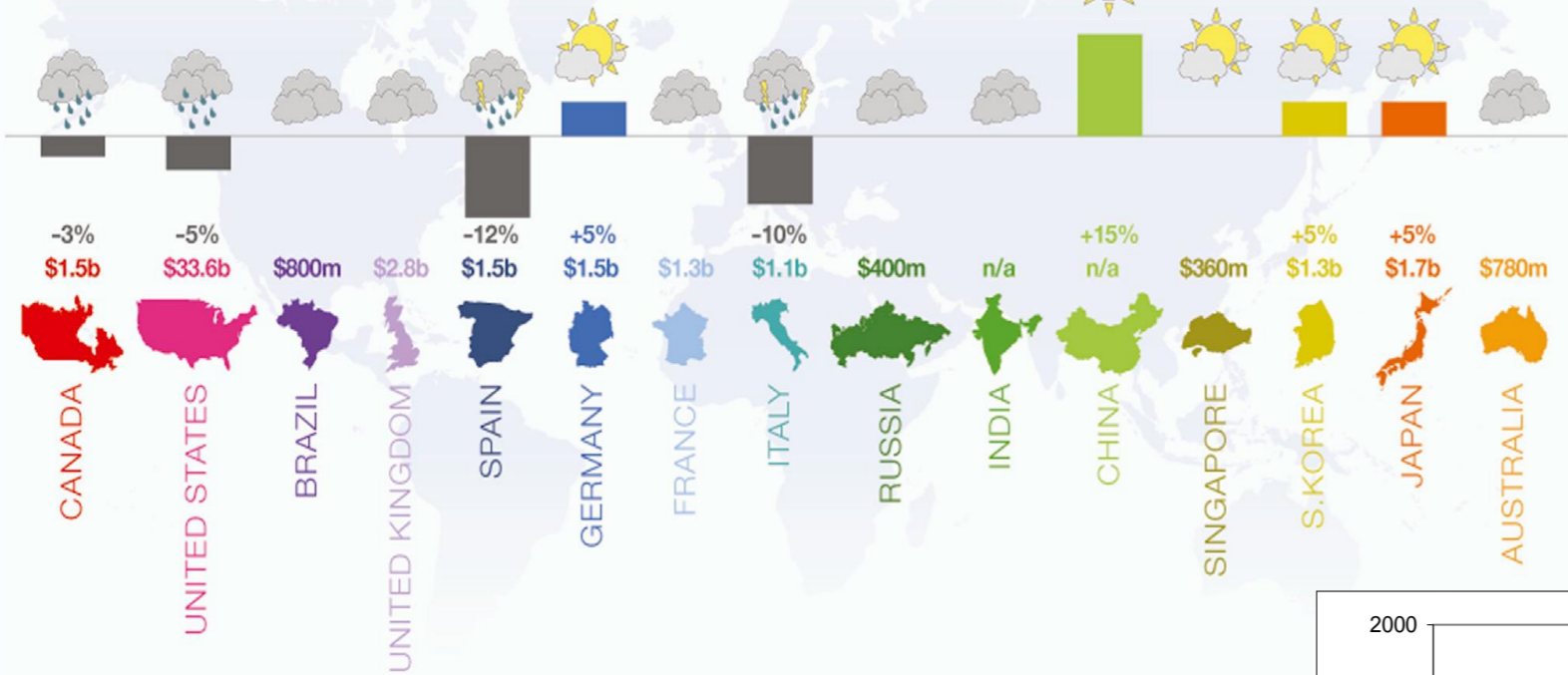
- Canada and other countries are struggling to match available funds with the capacity we have created.
- Governments are asking for increased accountability, along with an intensified emphasis on applied research and evidence of socioeconomic impacts from research dollars invested.
- The entire continuum of types of research activities must be maintained and the right balance found between investigator-initiated and priority-driven funding investments.
- Research is evolving, with increasing multidisciplinary, increasing team size, increasing globalization and increasing interest in partnerships.

As a federal health research agency, CIHR must maintain a balance between investigator-initiated research and research addressing the strategic priorities of the Government/taxpayers, Governing Council and Science Council.

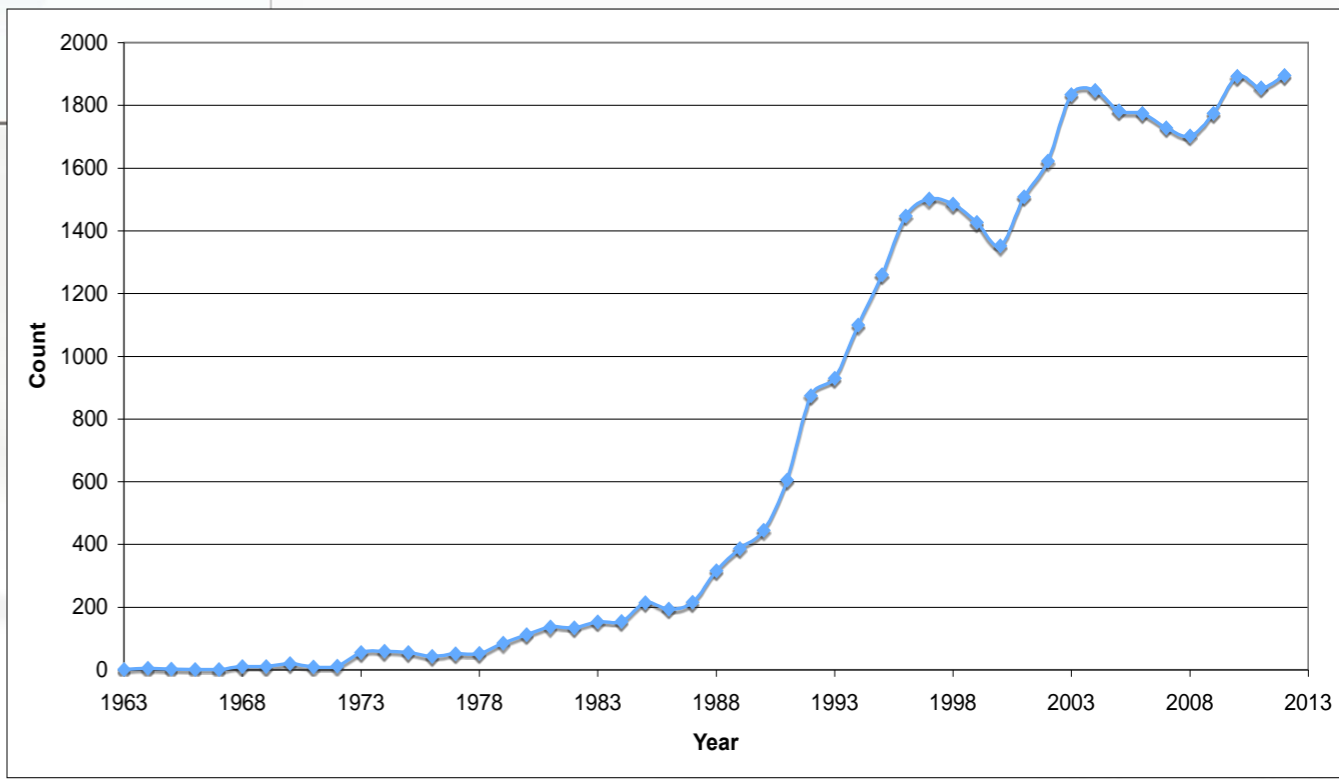
Drivers for Change: An international perspective

GLOBAL FUNDING OUTLOOK 2013

Percentages are author estimates. Cash amounts are most recent OECD figures for health Government Budget Appropriations or Outlays on Research and Development (GBAORD) except that for Brazil, Russia and Singapore, which are author estimates.



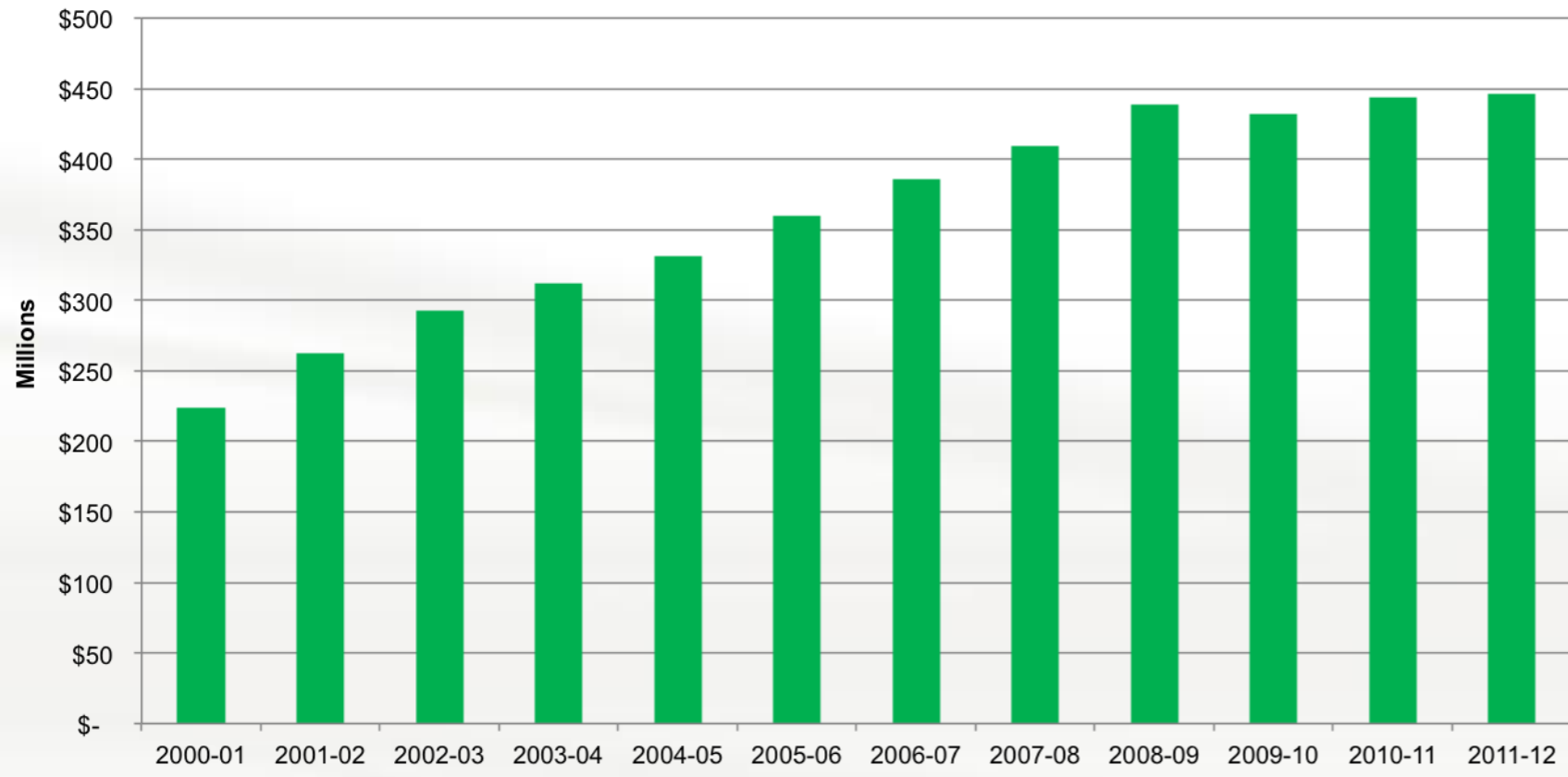
Macilwain C. Biology Boom Goes Bust. Cell. 2013 154(1):16-19.



Pubmed: "Biomedical Research Funding" (total 37,069; 2, 1963; 1896, 2012)

Drivers for Change: Funds versus Capacity

Investigator-driven (Open operating grants program (OOGP)) budgetary envelope



2011-12:

new grants: 802
 # applications: 4,578
 Average multi-year grant size: ~\$600k
 Success rate: 17.5%

2007-08:

new grants: 816
 # applications: 3,625
 Average multi-year grant size: ~\$540k
 Success rate: 22.6%

CIHR's current commitment: maintain approximately the same number of PIs in the system (~800 new grants/year)

The **objectives** of CIHR's reforms to **investigator-initiated programs** are to:

- Capture excellence across all four research pillars, from knowledge creation to knowledge translation
- Capture innovative, original and breakthrough research
- Integrate new talent to sustain Canada's pipeline of health researchers
- Improve sustainability of the long-term research enterprise

And reduce applicant and peer reviewer burdens:

- On average, **169 hours** and **\$10,878 (\$14,000 with peer review)** to complete a CIHR grant whose chance of success is <20%
- Many **PIs hold multiple grants** to run their research programs
- CIHR has 53 standing peer review committees with over **2,300 reviewers** for the OOGP, but many applications pass amongst committees due to lack of expertise
- The number of committees **keeps on growing** to accommodate applications not easily reviewed in the existing committees
- **Increasing difficulty to recruit reviewers** as the needed expertise often resides with members in conflict, applying for funds, or sitting on a different peer review committee

Reform and reduce twelve Open programs to two separate, complementary funding schemes:

Foundation Scheme - provide a sustainable foundation of health researchers; recognize track record of success in program of research; allow flexibility to explore high risk innovative research

Project Scheme - support a diverse portfolio of health-related research and knowledge translation projects at any stage, from discovery to application, including commercialization

Reform peer review to match peer review criteria to program attributes and use enhanced enabling technologies:

- Application-focused review

- Multi-stage review

- Structured review criteria

- Remote review of applications at the initial stage(s)

Support the peer review enterprise with a College of Reviewers that will support excellent peer review across the spectrum of health research

CIHR's commitment: Use an evidence-informed approach to program design and peer review

- Ongoing quality improvements can be achieved by “tweaks”.
- In order to truly respond to big drivers, we need to undertake a system change.

System change is increasingly being seen internationally. We are NOT the only ones implementing change – Wellcome Trust UK, ANR France, MRC UK, NHMRC Australia, NSF US, NIH US.....



PhD, Biochemistry, Johns Hopkins University

Postdoc, Stanford University

Professor, Molecular Biology, Johns Hopkins Medical School

Professor, UBC, Medical Genetics, and Michael Smith Labs

I love yeast, as a model organism for studying chromosomes
as a “yeast person”



Director, Michael Smith Laboratories, UBC

Chair, Board of Scientific Counselors, NHGRI, NIH

Institute of Genetics Advisory Board, CIHR

President, Genetics Society of America

Chair, Planning and Priorities Committee, CIHR (2001-2011)

“Integrating the physical and applied sciences into health research”

Chair, Planning and Priorities Committee, CIHR (2012- present)

“Models and mechanisms to therapeutics”

Biomedical Research / Science Funding in Canada

Tremendous opportunity, tremendous concern

A 10 year period investing in R &D and innovation in Canada
(CFI, CRC, NCE, Genome Canada, CIHR, NSERC)

CFI has built research infrastructure very significantly

CRC has expanded the community of outstanding research scientists

----Building capacity----

Now is the critical time to expand (balance) research grant operating funds at the appropriate scale

----Fuelling capacity----

There is a serious shortfall in operating funds to fuel the available research capacity/opportunity

Human genetic variation and disease: What the history books will say

1980- 2020

Constructing “A genetic anatomy of human disease”

Identify the genetic variants that cause human disease

2000- 2040

Addressing “The grand challenge”

Understand how genetic variants cause disease

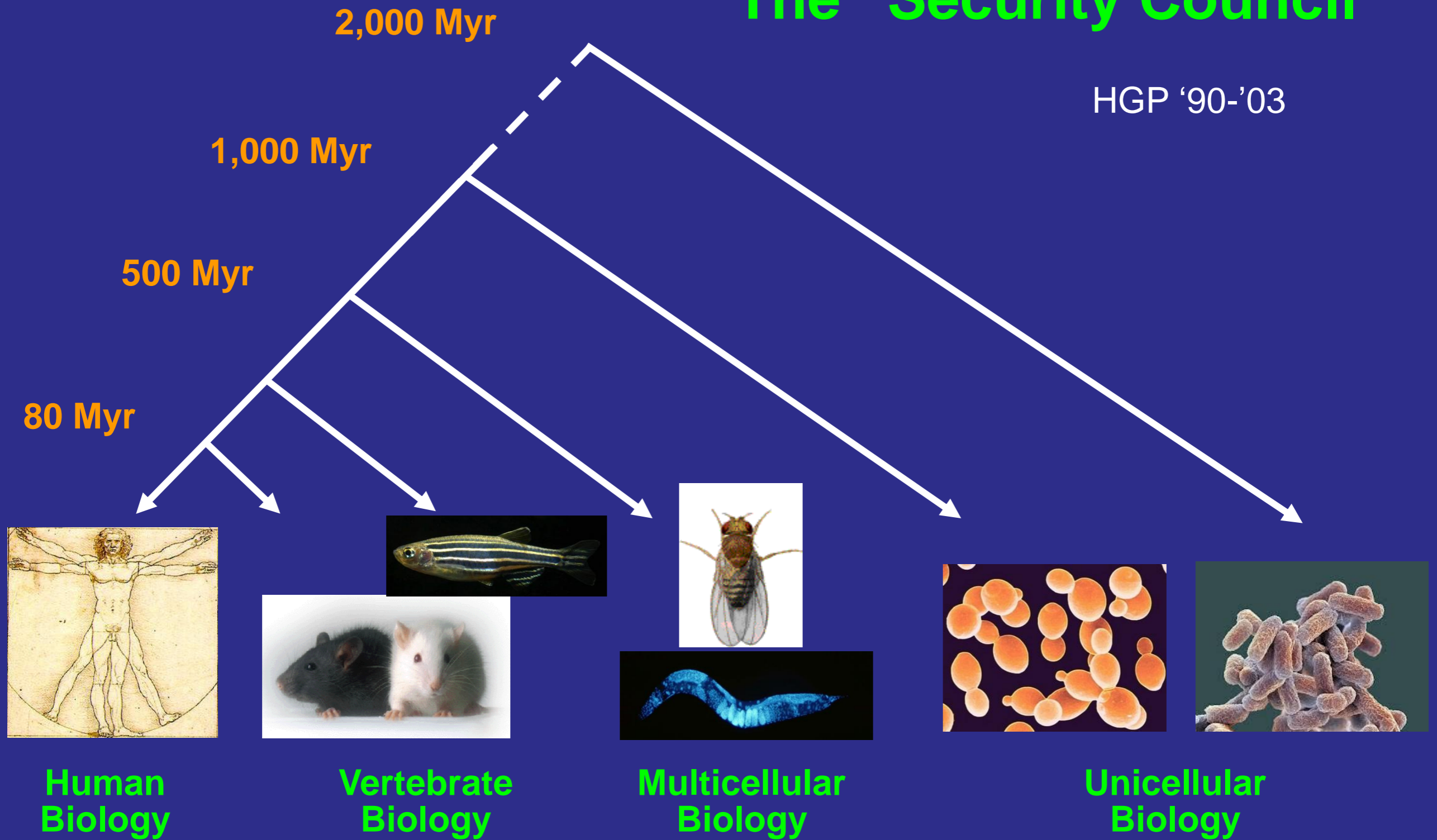
Analyze gene/ pathway function

Translate knowledge of gene function to advancements in prevention, treatment, and diagnosis of human disease

Model Organisms

The "Security Council"

HGP '90-'03



The Model Organisms

(yeast, E. coli, worms, flies, zebrafish, mouse)
are Nature's gift to health research.

They will be critical in functionalizing human
genetic variants that cause disease

and in paving the way to developing rational
therapies, and disease prevention strategies

for decades to come!



Depth of Rare Diseases

>4,000 rare disease genes discovered in the next 6 years, would =

2 new disease gene discoveries per day from now until 2020

suspected single gene disorders
~3500

**~7000
diseases
below
the
surface**

Model Organisms and Human Disease

Gene, pathway, network **Function**
Evolutionary conservation



Mechanisms of human disease, normal biology



Therapy, prevention

The keys:

Vibrant research communities

DiseaseGene identification, GeneFunction analysis

Collaboration, communication, exchange

Medical scientists ↔ Basic scientists

Tremendous opportunity, tremendous concern

Basic discovery is (and will remain) strategic!

- Importance of investigator initiated research

- Collaboration and cross talk

- Balancing basic vs. applied research

Research capacity exceeds research “fuel”

- Balancing people, infrastructure, operating \$

Funding at the CIHR / NSERC interface

- Integrative biology, technology, genome science

Importance of grant peer review

- Review quality is key

- Balancing support of junior and senior Pi's