Translating Academic Research into an Innovative Canadian Business Sector

Presented by: Natalie Dakers, President and CEO
The Centre for Drug Research and Development (CDRD)

Created for: Celebrating CIRS – Accelerating Sustainability

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Presentation Overview

- The Canadian Innovation Landscape
- The Life Sciences Sector
- The Health Research Commercialization Gap
- CDRD’s Mandate and Model
- Factors for Success
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Canada’s Science & Technology Strategy - 2007

- A comprehensive, multi-year S&T agenda with new commitments that build on existing strengths:
  - Drive and ingenuity of our people
  - Strong fiscal position
  - Strong research base

- Four priority areas
  - Environmental science and technologies.
  - Natural resources and energy.
  - Health and related life sciences and technologies.
  - Information and communications technologies.

Centres of Excellence for Commercialization and Research (CECR) Program

- Creates centres to advance research and facilitate commercialization of technologies
- $285 million over five years (2007-2012)
- 17 CECRs established to date, including CDRD
Government Continues to Increase Investments in Research

Annual Funding from Canada’s Major Research Granting Bodies

Total R&D Investment as % of GDP

Canadian university R&D ranked second by OECD as % of GDP

Between 1998 and 2007, BC moved from 6th to 3rd among the provinces in spending on research and development as a percent of GDP.
....But Returns Have Not Been Maximized

"Needed urgently: more creativity from the business class,"
Globe and Mail, May 2009

"Canadians are an inventive lot, but have trouble making it pay"
Globe and Mail, Oct. 2011

CANADA HAD A NET LOSS IN TECH TRANSFER PAYMENTS IN 2009
Royalty and licence fees 2009* in billions of U.S. dollars

*Royalty and licence fees are payments for the use of protected assets, such as patents, copyrights, trademarks, industrial processes and franchises, as well as original films and manuscripts.

SOURCE: THE WORLD BANK, ROYALTY & LICENSE FEES (RECEIPTS & PAYMENTS), IMF, BALANCE OF PAYMENTS STATISTICS YEARBOOK AND DATA FILES
QUESTION: “If innovation is good for business, why is Canadian business less committed to innovation than most policy-makers believe it should be?”

- Panel of senior business people, labour, academia and NGO communities
- Asked for a diagnosis, not a policy prescription
- Long-term perspective covering many decades
- Analyzed innovation as an economic process, not simply as an S&T activity
Synopsis of Report

- Canada’s long-standing productivity growth problem due to weak business innovation.
- Business innovation is driven by business strategy.
- The productivity issue needs to be reframed to focus on the factors that influence businesses to choose – or not to choose – innovation as a key competitive strategy.
- Public policy has an important role, but the primary challenge is for business to adopt innovation-oriented strategies.

**NEW PARADIGM LINKING PRODUCTIVITY, INNOVATION AND BUSINESS STRATEGY**
Venture Capital Performance

There was found to be a decline in the 10-year rate of return for VC funds in both the U.S. and Canada following the end of the tech boom, but the fall-off was steeper in Canada and from a much lower level to begin with.

* The first three values for Canada are for 1995-2002 (seven years), 1995-2002 (eight years), and 1995-2003 (nine years), respectively.

Data Source: CVCA, 2007; NVCA, 2008.
Venture Capital Annual Fundraising (2003-2007)

Amount of funds committed to US VC firms were increasing while Canadian commitments fell.

New funds obtained by VCs in Canada were only 3% to 6% of U.S. levels 2005-2007.

* U.S. data converted to $C at market exchange rate.

The Result: Canada’s Total Annual Venture Capital Investments in Significant Decline

Source: Canadian Venture Capital Association (CVCA)
Global Venture Capital Comparisons

Total Venture Capital Investment as a Percentage of National GDP (2009)

Sources: Canadian Venture Capital Association & World Bank

Six primary recommendations:

- Create an Industrial Research and Innovation Council (IRIC) to deliver the federal government's business innovation programs.
- Simplify the tax credit system supporting SMEs.
- Make business innovation a core objective of procurement.
- Transform the institutes of the NRC into large-scale, collaborative centres involving business, universities and the provinces.
- Help high-growth innovative firms access risk capital via BDC
- Establish a clear federal voice for innovation and work with the provinces to improve coordination.
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Canada’s Life Sciences Sector

- A rich history of innovation dating back to *Banting & Best* and the discovery of Insulin (1922)
- 1988 to 2008: 77% increase in the number of companies\(^1\)
- Approximately 695 companies today\(^2\)
  - Employing 29,000 highly-skilled workers\(^3\)
- +215 public sector health research organizations\(^2\)

Number of Companies per Industry Sub-Sector\(^2\)

![Pie chart showing distribution of companies by sector](chart.png)

Sources:
\(^1\) BioTalent Canada, 2008
\(^2\) BIOTECanada, 2007
\(^3\) Invest in Canada, 2007
Canada’s Bio-Based Economy

- Valued at $78.3 billion (6.4% of GDP)\(^1\)
- 2009 private sector health R&D expenditures of $1.9 billion\(^2\)
- 2010 clinical trial expenditures of $464 million\(^3\)
- Second highest density of active clinical trial sites per capita in the world \(^4\)

Value of International Bio-Economies Per Capita\(^1\)

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<th>Country</th>
<th>2002 Canadian dollars</th>
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<td>United States</td>
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</table>

Sources:
\(^1\) *Industrial Biotechnology, Winter 2008*
\(^2\) *Statistics Canada, 2009*
\(^3\) *Patented Medicine Prices Review Board – PMPRB, 2010*
\(^4\) “*Nature Reviews Drug Discovery*”, 2008
Canadian Industry Successes

- Canada ranked #3 for biotech innovation in the 2010 Scientific American worldVIEW survey

- Angiotech Pharmaceuticals’ paclitaxel-eluting coronary stent, TAXUS®
  - The most successfully launched product in medical history
  - First year sales of $2.5B US
  - Now implanted in over five million patients worldwide

- QLT Inc.’s Visudyne® (verteporfin)
  - The first therapeutic treatment approved worldwide for certain forms of wet age-related macular degeneration (AMD)
  - One of the most successful ophthalmology products ever launched
  - Annual worldwide sales topping $1.5B US

- Aspreva Pharmaceuticals acquired by Galenica Group for $915M
  - Yielded an IRR of 272% per annum to VCs
  - A return multiple of 23.4 times capital invested
Presentation Overview

The Canadian Innovation Landscape

The Life Sciences Sector

The Health Research Commercialization Gap

CDRD’s Mandate and Model

Factors for Success
• Although support of basic and applied research has increased around the world, the number of new therapies has not

• Additional focus and resources must be directed to the commercialization of research by the private sector

• The cost of developing a new therapeutic is such that private sector investment is essential

• This investment has traditionally come from venture capital, but access to this funding is now extremely limited

• This is due at least in part to:
  • The extremely high risk nature of life sciences investing
  • Barriers that prevent universities and industry from collaborating
Bridging the Gap Between Discovery and Commercialization

- Academic research doesn’t take discoveries to an ‘investable’ point
- Traditional granting sources and angel funds are not sufficient to fuel the growth of the life sciences industry given the lack of venture funds
- Commercialization gap exists between discovery and commercial opportunity
The CDRD Solution

A robust commercialization engine

Transforming Discovery into Opportunity.....
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The Centre for Drug Research and Development

**Mandate**

**CDRD** was created to de-risk promising discoveries stemming from publicly-funded health research and transform them into commercially viable opportunities for the private sector.

The **Private Sector** is then responsible (and now much better positioned) to develop them into new treatments for patients.

And **Government** realizes the maximum economic and societal ROI on their research investment....and (hopefully) re-invests back into research.
This Type of Translational Research Vehicle is Critical Because....

**Academia lacks**
- Funding for proof of concept studies to the level required for validation
- Drug discovery “know-how” (medicinal chemistry, ADME/Tox expertise)
- State-of-the-art screening facilities and libraries (and often no professional, dedicated staff)
- An ability to speak “business”

**Industry lacks**
- Desire to invest in early-stage research (too high risk)
- Efficient access to innovation in universities
- Confidence of data generated
- An ability to speak “academic”
CDRD’s Role in Filling the Commercialization Gap

Basic Research and Discovery > Proof of Concept > GLP Preclinical Toxicology >

Clinical
Phase 1 > Phase 2 > Phase 3 >

GOVERNMENT PROGRAMS FOUNDATIONS > INFRASTRUCTURE EXPERTISE FUNDING > INVESTMENT CAPITAL >
CDRD’s Flexible Model = Powerful Commercialization Engine

- Public-private, not-for-profit
- Academic partners
- Expertise & infrastructure
- Access to non-dilutive capital
- No claims on original IP

- Commercial Arm
- Third-party transaction vehicle
- First rights to negotiate technology
- Manages IP
- Profits returned to CDRD
CDRD’s Expanding Network of Affiliated Research Centers

20+ affiliated institutions around the world

1500+ Principal Investigators

$2 billion+ in health research per year
Projects are Supported by Three Innovation Funds and one CVI Fund. We have Successfully Raised with Partners.

- Pfizer-CDRD Innovation Fund
- Genome BC-CDRD Development Fund
- Western Canada Innovation Fund
- Roche Global CVI Fund

Approximately $18.5 million for projects
Funding: Proven Record of Leveraging Funding for Research

CDRD grant success rate of 47% is more than 2X the national average.

CDRD has leveraged $1.6M of in-kind funding into $12M of project funding.
Training & Mentoring at CDRD

- CDRD has ~85 highly-skilled personnel
  - Over 60% with Masters or PhD

- Trainees form a key part of the CDRD workforce
  - Lab rotations
  - Workshops and seminars
  - Mentorship

- 78 Post-Docs, Co-ops, and Interns trained

- 30 workshops
  - 500+ participants
- 27 seminars
  - 800+ participants
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Factors for Success

Success requires an effective well-resourced interface between industry and academia with critical infrastructure, expertise and project pipeline.
Partnerships are Core to CDRD’s Success
For more information about the work of the Centre for Drug Research and Development (CDRD), please visit: www.cdrd.ca