CIHR and Precision Medicine: Personalized Health

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Canadian Institutes of Health Research

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Health and Health Research Priorities
Top 10 Global Trends

Baseline 2010-13

- E-Health Innovations
- Health System Quality
- Big Data and Other Data Platforms
- Health Promotion and Primary Prevention
- Emerging and Re-Emerging Infectious Threats
- Health Human Resources
- Risk Factors and Determinants of Health
- Health System Evaluation and Evidence-Based Care
- Long-term management and care
- Health System Cost-Efficiency

2014

- Health System Quality
- Health Promotion and Primary Prevention
- Big Data and Other Data Platforms
- Health System Cost-Efficiency
- E-Health Innovations
- Emerging and Re-Emerging Infectious Threats
- Patient-centered care
- Health Human Resources
- Medical technology innovations
- Personalized Medicine, Genomics and Biomarkers
CIHR’s Personalized Medicine Roadmap Signature Initiative

Enhance health outcomes through patient stratification approaches by integrating evidence-based medicine & precision diagnostics into clinical practice.

- Develop & translate discoveries
  - Biomarkers, targets & genomic signatures
- Diagnostics & innovative devices for clinical use
- Support policy & practice
- Improve the evidence base on how to assess & integrate innovative diagnostics & therapeutic approaches into practice.
Canadian Personalized Medicine Stakeholder and Variable Map

T. Ryan Sigouin, Health Canada adapted by Inga Murawski CIHR-ICR and Etienne Richer CIHR-IG
CIHR’s Personalized Medicine Signature Initiative: Investment and Partnership Summary

Initial business case
$100,100,000

Current total and planned
$242,875,777

Partnerships

# of External Competition Partners: 39
# of External Applicant Partners: 76
# of Partnership Events: 5

Projected Commitments: $156,715,055
Projected Leverage Ratio: 1:1.82

Firm Partner Commitments: $147,215,050
Current Partner Leverage Ratio: 1:1.78
(From funded opportunities only, incl. Applicant Partners)

Projected Leverage by Partner Type

<table>
<thead>
<tr>
<th>Partner Type</th>
<th># of Competition Partners</th>
<th># of Applicant Partners</th>
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</thead>
<tbody>
<tr>
<td>International</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Academia</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Voluntary and Not-For-Profit Sector</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Government - Provincial and Territorial</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Government – Federal</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Industry</td>
<td>1</td>
<td>10</td>
</tr>
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Amount Leveraged (in $M)

- Applicant Partners $ (Appl)
- Competition Partners $ (Comp)
Genomics and Personalized Health: 2012 Large-Scale Applied Research Project Competition

**CIHR/Genome Canada partnership:** One of the most significant public sector investments in Personalized Medicine

- Research projects span various areas including cancer, rare diseases, epilepsy, inflammation, HIV, cardiovascular disease and autism

**Investment:** over $165M

- $68.8M CIHR (IG, ICR, INMHA, III, INMD, IHSPR, and initiatives) /GC investment with more than 1:1 match from outside sources

**Projects funded:** 17

- 15 large-scale applied research projects with integrated GE3LS
- 2 large-scale GE3LS research projects
- E.g., Rioux, John D - IBD Genomic Medicine Consortium (iGenoMed): translating genetic discoveries into a personalized approach to treating the inflammatory bowel diseases
Foster international collaboration in rare diseases research

- Deliver 200 new therapies for rare diseases and
  - 155 as of September 18th
- Means to diagnose most rare diseases by the year 2020
  - About 3500 as of September 18th

- 43 funding members (including E-Rare) & 3 invited patient advocacy groups

- Minimal commitment: US$10 million over five years in research projects contributing towards the goals of IRDiRC

- CIHR & Genome Canada joint commitment of $25 million to IRDiRC while the

- Total pledges of the consortium nearly $2 billion
Orphanet Canada

Mission

• To provide the community at large with a comprehensive set of information to contribute to the improvement of the diagnosis, care and treatment of patients with rare diseases.

National objectives are to

• Create a national entry site to communicate at the national level on activities of the national Orphanet team, rare disease events, and rare disease policies in the country
• Comprehensively document resources available in Canada: expert centers, medical laboratories, patient organisation, research projects, clinical trials, and registries and biobanks
• Outreach to all stakeholders of the Orphanet-Canada project and facilitate exchanges between group of stakeholders

<table>
<thead>
<tr>
<th>Resource</th>
<th>Completed</th>
<th>Expected</th>
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<tbody>
<tr>
<td>Clinics</td>
<td>47</td>
<td>-</td>
</tr>
<tr>
<td>Diagnostic tests</td>
<td>487</td>
<td>25</td>
</tr>
<tr>
<td>Patient Organizations</td>
<td>78</td>
<td>135</td>
</tr>
<tr>
<td>Clinical Trials</td>
<td>27</td>
<td>34+</td>
</tr>
<tr>
<td>Registries</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Research Projects</td>
<td>148</td>
<td>155</td>
</tr>
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http://www.orpha.net
Rare Diseases Research Catalyst Network

Creation of a national network organized to:

- Identify Canadian model expertise relevant to newly discovered human disease genes
  - Funded research projects focus on functional validation
- Enhance clinical translation
  - Develop and implement innovative knowledge translation strategies/activities to link clinical genetics & model research communities

**Investment:** $2.3 M CIHR-IG in partnership with GC

<table>
<thead>
<tr>
<th>Principal Investigators</th>
<th>Title of Project</th>
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<tr>
<td>Philip A. Hieter (UBC)</td>
<td>Canadian &quot;Rare Diseases: Models &amp; Mechanisms&quot; Network (RDMM)</td>
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<tr>
<td>Kym Boycott (CHEO)</td>
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<tr>
<td>Janet Rossant (SickKids)</td>
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Drug Repurposing Initiative

Repurposing Research in Rare Diseases: Cures Within Reach/CIHR Collaborative Funding Program

• **Goal:** to support efforts on proof of concept clinical trials repurposing human approved drugs for new disease indications

• **Proposal requirements:**
  – generate clear deliverables with immediate applications, including off-label use, for rare diseases management;
  – propose novel (evaluation criteria to lower projects that have been done) proof of concept clinical trials involving, multiple clinical sites in Canada and the United States of America, and;
  – propose an adequate development plan to ensure the realization of the expected benefits.

• **Budget:** $1.5M USD (CIHR and CWR)/3 years
Personalized Medicine cuts across Roadmap II’s Four Strategic Research Priorities

RESEARCH PRIORITY A: Enhanced patient experiences and outcomes through health innovation

RESEARCH PRIORITY B: Health and wellness for Aboriginal peoples

RESEARCH PRIORITY C: A healthier future through preventive action

RESEARCH PRIORITY D: Improved quality of life for persons living with chronic conditions

Strategy for Patient-Oriented Research (SPOR)

Big Data-Health Data initiatives

Canadian Epigenetics, Environment and Health Research Consortium (CEEHRC)

*Personalized Medicine

Environments and Health

Pathways to Health Equity for Aboriginal Peoples

Canadian HeLTI cohort – Indigenous Peoples

**Targeted indigenous peoples’ health research funding pools in many other initiatives

e-Health Innovations
Enablers for Precision Medicine: Strategy for Patient-Oriented Research (SPOR)

• Coalition of federal, provincial and territorial partners (patients, researchers, health care providers, provincial health authorities, academic health centres, charities, pharmaceutical sector, etc) dedicated to the integration of research into care

• Fostering evidence-informed health care by bringing innovative diagnostic and therapeutic approaches to the point-of-care

• Effecting changes to health care policies and practices
SPOR - Critical Elements to enhance Integration of Research and Care

- Patient-Oriented Research and Knowledge Translation Networks
- Support for People and Patient-Oriented Research and Trials (SUPPORT) Units
- Training and Career Development
- Improving the Environment for Clinical Research
- Patient/Consumer Involvement and Engagement
SPOR: SUPPORT Units and Networks

**SUPPORT Units:** provincial, territorial or regional centres providing support and expertise on data access, methodological and research services, knowledge translation, clinical trials and capacity development

- specialized and multidisciplinary methodological expertise
- biostatistical analyses
- linked administrative databases, patient and treatment registries, drug information systems, electronic health records, and other data

**SPOR Networks**
1) Youth and Adolescent Mental Health
2) Primary and Integrated Health Care Innovations
3) Chronic Disease (5 awarded in February 2016)
SPOR: Enabling Personalized Medicine

- Link with SUPPORT Units and other SPOR activities
- Opportunities to move personalized medicine tools and approaches into the health care system
- Involvement with translational activities, clinical utility studies, etc through SUPPORT Units
- Access to linked administrative data, research data, clinical data
- Potential to connect with patients through SUPPORT Units
- Sharing of best practices and strengthened networking across Genome Centres
- Link with SPOR Networks in Chronic Disease (common focus on translational research)
Data Strategies and Policies: Enabling Personalized Medicine

CIHR is leading and contributing to many open science/open data activities...

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<tr>
<th>Examples</th>
<th>Strategic Opportunities</th>
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<tr>
<td>- Open Government / Open Science</td>
<td>Focus on increasing and enhancing:</td>
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<tr>
<td>- National Strategy for Bioinformatics &amp; Computational Biology</td>
<td>Better data attributes</td>
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<tr>
<td>- Tri-Agency Open Access Policy on Publications</td>
<td>Data management</td>
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<td>- Tri-Agency Statement of Principles on Digital Data Management</td>
<td>Data access</td>
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<td>- Acting upon the CCA report on Timely Access to Health Data</td>
<td>Data linkage</td>
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<td>- Data components within CIHR Signature Initiatives (e.g., eHealth, Environments &amp; Health, CLSA, CCNA, SPOR SUPPORT Units, Epigenetics, Personalized Medicine)</td>
<td>Infrastructure and tools</td>
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<tr>
<td>- Canadian Research Data Centre Network</td>
<td>Digital skills</td>
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<td>- Global Alliance for Genomics and Health</td>
<td>Collaborations and partnerships</td>
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<tr>
<td>- Advancing Big Data Science in Genomics Research</td>
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<tr>
<td>- Cancer Genome Collaboratory</td>
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<tr>
<td>- Sharing Big Data for Biomedical Discovery</td>
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However, translational bioinformatics requires a cohesive, consistent and coordinated approach.
Transition from Reactive Medicine to P4 Medicine or Precision Health

- Shifting emphasis from reaction to prevention, and from disease to wellness
- Personalized medicine – focus on stratified treatment, but also prevention, prediction and care
- Integrative, interdisciplinary, cross-sectoral approaches