



GenomeCanada
20 YEARS
ANNÉES

BACKGROUND

Five Genomic Applications Partnership Program Projects Funded

Genome Canada is proud to announce the launch of five new projects through its Genomic Applications Partnership Program (GAPP). GAPP funds translational research and development projects that address real-world challenges and opportunities identified by industry, government, not-for-profits, and other receptors of genomics knowledge and technology.

Demand-driven genomics collaborations help Canada harness the power and potential of bio-innovation to create healthier, more sustainable and prosperous communities. Targeted investments support outcome-oriented partnerships across university, business, the not-for-profit and public health sectors to generate Canadian-led solutions.

Together, the five GAPP projects (all in Round 19) represent a total investment of \$26.4 million in research funding, of which \$8.6 million is from Genome Canada and \$17.8 million is from co-funding partners including provincial governments, private sector and not-for-profit organizations.

Title: Canadian Prairie Metabolic Network

Academic Leader / Institution: Cheryl Rockman-Greenberg (University of Manitoba)

Receptor Leader / Organization: Petr Kresta (Shared Health)

Genome Centres: Genome Prairie and Genome Alberta

Total Funding: \$6.1M

Part of the [All for One precision health initiative](#)

Inborn errors of metabolism (IEM) are genetic diseases caused by mutations in either the nuclear or mitochondrial genome. Although each of the more than 600 known IEMs is individually rare, together they affect more than 6,400 patients in the Prairies—primarily children. Throughout the Prairie provinces, there is a limited local capacity for next-generation sequencing causing delays which limit the benefits of early diagnosis, early treatment, and improved outcomes. These delays result in adverse outcomes in patients. This project will combine clinical and laboratory approaches to ensure patients have timely access to new diagnostics, new therapies, and clinical and specialty supports. The Canadian Prairie Metabolic Network (CPMN) will provide access to a full range of multidisciplinary expertise, develop best practice approaches, and provide, as needed, clinical specialist coverage for generalist physicians and their patients. It will also ensure the timely and more cost-effective delivery of innovative and relevant genomic testing in the Prairies, including rapid, inexpensive mitochondrial DNA testing not available elsewhere; generate genomics data that will stay in Canada; and contribute to knowledge and expertise in Canada across multiple disciplines and specialties. The result will be the timely treatment and improved outcomes for IEM patients.



Title: Cardiovascular Biomarker Translation Team 2 – Atrial Fibrillation

Academic Leader / Institution: Peter Liu (University of Ottawa)

Receptor Leader / Organization: André Ziegler (Roche Diagnostics International Ltd.)

Genome Centre: Ontario Genomics

Total Funding: \$6.0M

The early detection and treatment of atrial fibrillation is a high priority for patients and physicians. Atrial fibrillation is the most common cardiac arrhythmia in the world, affecting over 25% of the population over age 70. Patients with atrial fibrillation are at an increased risk of a number of complications, including stroke, cognitive impairment, dementia, paralysis and heart failure. There are currently no established biomarkers to guide the clinical management of patients with atrial fibrillation. This project will develop and validate a diagnostic biomarker panel for atrial fibrillation that will enable the early detection of atrial fibrillation and predict the risk of complications. It will also improve the care of patients with this condition by predicting best treatments and outcomes. The results of the improved decision making in atrial fibrillation is expected to save over \$200 million per year in health care costs in Canada alone.

Title: Complex Gill Disease Initiative

Academic Leader / Institution: Mark Fast (University of Prince Edward Island)

Receptor Leaders / Organizations: Kathleen Frisch (Cermaq Canada) and Tim Hewison (Grieg Seafood)

Genome Centres: Genome Atlantic and Genome BC

Total Funding: \$4.7M

Salmon production in Canada is under increasing threats from infectious and non-infectious diseases such as complex gill disease. Over the last decade gill health and associated disease has been a growing challenge in salmon farming operations in both the Pacific and North Atlantic. Complex gill disease is a multifactorial condition resulting from the interaction of environmental and husbandry conditions as well as infection by pathogens and parasites to create proliferative lesions, particularly during the summer and fall months. This project will validate biomarkers of healthy and compromised gills of Atlantic salmon and use these to develop an early warning system for the development of gill disease on Atlantic salmon production sites across Canada. The resulting genomics-enabled tools for fish health will guide the management and intervention strategies for complex gill disease in Atlantic salmon.



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Title: Development and Implementation of a Toolkit for Genomics-Assisted Breeding in Soybean

Academic Leader / Institution: François Belzile (Université Laval)

Receptor Leader / Organizations: Josh Cowan (Grain Farmers of Ontario and Canadian Field Crop Research Alliance)

Genome Centre: Génome Québec

Total Funding: \$7.0M

Soybean is the third most important crop in Canada, with approximately 6 million acres planted in 2018. The limiting factor for the continued expansion of the soybean crop is the development of new varieties with early maturity that also offer good yield for growers and the soybean industry. The toolkit that will be developed as part of this project will include an ultra-low-cost genotyping platform called NanoGBS+ as well as a genomic prediction tool that will guide breeders in choosing the most promising crosses to develop high yield, early maturity varieties in less time and at a reduced cost. The implementation of these tools will allow breeders to increase the rate of genetic progress and develop profitable very early maturing varieties that will thrive in the shorter Canadian summers and continue to fuel the expansion of the soybean crop across Canada.

Title: Development of an Epigenomic Profiling Tool to Facilitate Precision Medicine in Early Breast Cancer

Academic Leader / Institution: John Bartlett (Ontario Institute for Cancer Research)

Receptor Leader / Organization: Seth Sadis (Thermo Fisher Scientific)

Genome Centre: Ontario Genomics

Total Funding: \$2.4M

Cancer is responsible for 30% of all deaths in Canada. Over the past two decades, what were once considered to be homogenous diseases of a tissue (e.g., breast cancer) are now known to be heterogeneous even within well-established clinical subtypes. To better understand the individual nature of breast cancer in patients, the implementation of integrated 'omics solutions are needed to understand the combined effects of genomic and epigenomic changes in driving cancer progression and deliver on the promise of precision medicine. Emerging research in breast cancer implicates epigenomics in the regulation of multiple cancer processes including DNA repair and treatment response. The epigenomics data available across cancer driver genes from different ethnic groups, particularly from women of African descent, which further highlights the diagnostic importance of epigenomic features in patient care. This is critical in the equitable delivery of healthcare to patients, since a significant proportion of patients may not be adequately treated due to molecular processes influenced by differences in ethnicity. This project will develop and validate novel panel-based targeted approaches for the evaluation of epigenetic alterations in breast cancer to address two major needs: improved predictive and prognostic assays for all breast cancer patients and a focused study comparing methylation profiles between cancers in Black and Asian minority ethnic groups and other ethnic groups.